

THE NORTH AMERICAN SPECIES OF THE GENUS
LIMNOPHORA ROBINEAU-DESVOIDY, WITH
DESCRIPTIONS OF NEW SPECIES
(MUSCIDÆ, DIPTERA)

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INTRODUCTION

The genus *Limnophora* Robineau-Desvoidy comprises a large group of flies that are not familiar to collectors in North America except for their apparently uninteresting appearance. They are to be met with usually in the vicinity of water, especially along rivers and lakes, the immature forms presumably living an aquatic or semi-aquatic existence. On the other hand, the species belonging to the group *Gymnodia* Robineau-Desvoidy are commonly found near decay and filth, resembling the muscoid flies in habit.

The object of the present study is to bring together as completely as possible the records of species known to occur in North America with a view to facilitating their study and recognition. Numerous collections have been examined, and it is evident generally that there has been a considerable amount of misidentification, and that there are yet a number of species to be recorded. The fragmentary nature of the literature has also been a serious bar to further progress and interest.

The writer has had the privilege of examining the large faunal collections made by Dr. J. M. Aldrich in the Rocky Mountains and Alaska, by Dr. A. L. Melander, Mr. H. L. Seamans, and Mr. C. B. D. Garrett in the Rocky Mountains, by Mr. C. W. Johnson in the New England States, and by the late Professor J. S. Hine in Alaska.

The collections in the following institutions have been examined through the generous assistance of their keepers; the United States National Museum, Washington; Cornell Univer-

sity, Ithaca; the American Entomological Society, Philadelphia; the Boston Society of Natural History, Boston; the Canadian National Collection, Ottawa; the American Museum of Natural History, New York; the Field Museum, Chicago; and that of the Illinois State Natural History Survey, Urbana. I also have been privileged to examine the private collection of Dr. A. L. Melander, and of the late Professor J. S. Hine. Dr. E. P. Van Duzee has very kindly forwarded paratype material from the collection of the California Academy of Sciences, San Francisco.

I wish also to acknowledge the valuable advice and information offered by Dr. J. M. Aldrich, Dr. O. A. Johannsen, Dr. J. Villeneuve, and Mr. E. Séguy concerning the nomenclatorial problem arising from the unsatisfactory status of the generic name *Limnophora*.

To Mr. O. Ringdahl I am deeply indebted for the invaluable help and advice proffered concerning the identification of subarctic forms. Much of the new material was sent to Mr. Ringdahl for examination and comparison with Scandinavian forms.

I have also had considerable help from Mr. J. E. Collin in the identification of species occurring in Baffin Land and Greenland. In addition Mr. Collin has very kindly made the necessary comparisons of North American material with Walker's types in the British Museum, thereby rendering it possible to establish once more the identity of these little known species.

Mr. Collin has provided me with a list of species that he has recognized as occurring in Greenland, many of which I have not had the opportunity of studying. A few of these species are included in the records that follow, having been sent to Mr. Collin for study. The remaining species are listed at the close of the paper. All of these species are included by Mr. Collin in a paper on the Greenland species of *Limnophora* that has recently been published in the Transactions of the Entomological Society of London (6a).

EXPLANATION OF TERMS USED IN KEYS AND DESCRIPTIONS

Every effort has been made to discover additional, tangible characters among species that are apparently difficult to distinguish under the best of circumstances. A few such have been

grasped and used in the hope that they may be of some use in studies of a limited nature. Whether such characters will survive the test of wider application is entirely questionable.

The following explanations are offered with a view to aiding in the detection of little known characters that may be mentioned, to clarify the descriptive terminology used, and to assure a common understanding when making measurements.

Unless otherwise stated, the measurement between the eyes is taken at the narrowest distance of separation, which is usually at middle of frons; the breadth of parafacial is measured at base of antennæ when the head is viewed in profile; the height of cheek is taken at the narrowest distance between the margin of eye and the ventral border of head, at a point previous to the upward curvature of the head capsule defining the occipital and genal regions.

The oral margin is said to be protruded beyond the base of antennæ when projecting beyond a line drawn in a vertical plane from the most anterior part of parafacial. In other words, when the head is viewed in profile, the axis of the head capsule at a level with the oral margin is greater than that at a level with base of antennæ.

The mesonotum, unless otherwise stated, is viewed from above and in front.

The accessory bristles of the mesopleural series of bristles occur in the marked intermission between the dorsal and following bristles in the series. This interspace is bare in many species, and is filled by one or more weaker bristles in a few species, *e.g.*, (*Spiligona*) *aerea* (Zetterstedt), *novæ-angliæ* Malloch, *imitatrix* (Malloch).

The scutellum of many species in the subgenus *Spilogona* Schnabl and Dziedzicki possesses one or more setulose hairs which are appressed and directed caudad. These hairs are situated on the dorsal margin of lateral declivities adjacent the apical bristles, *e.g.*, (*S.*) *aerea* (Zetterstedt), *rufitibia* Stein, *obscuripennis* Stein. On the other hand such scutellar hairs are not present in (*S.*) *narina* (Walker), *alticola* Malloch, *torreyæ* Johannsen, and *suspecta* Malloch.

The abdomen is viewed from above and behind unless otherwise stated.

The first visible tergum is designated as terga 1 + 2, the second as tergum three, the third as tergum four, and the fourth as tergum five.

The basal sclerite of hypopygium is situated immediately caudad of tergum five.

The veins of the wings have been named according to the system introduced by Comstock and Needham (7),* and is as follows:—

First longitudinal vein	= Radius I.
Second longitudinal vein	= Radius 2 + 3.
Third longitudinal vein	= Radius 4 + 5.
Fourth longitudinal vein	= Media 1 + 2.
Fifth longitudinal vein	= Media 3 plus Cubitus I.
Sixth longitudinal vein	= Cubitus 1 plus first Anal.
Anterior cross vein	= Radius—Media cross vein.
Posterior cross vein	= Media—Cubitus cross vein.

Genus *Limnophora* Robineau-Desvoidy

Limnophora Robineau-Desvoidy, Essai Myodaires, 1830 p. 90.—Macquart, Hist. Nat. d. Ins., 1835 II p. 309.—Schiner, Fauna Austr., 1862 I p. 621—Rondani, Della Soc. Ital. Scienze Naturali, 1866 IX pp. 72 . 137.—Rondani, Dipt. Ital., Prodr., Part V 1877 pp. 11 . 103.—Osten Sacken, Misc. Coll. Smithsn. Inst., 1878 III p. 167.—Meade, Ent. Month. Mag., 1881 XVIII p. 101.—Bigot, Ann. Soc. Ent. France, 1883 (1882) ser. 6 II p. 18.—Schnabl, Horae Soc. Ent. Ross., 1890 (1889–1890) XXIV pp. 493 . 501.—Stein, Ann. Mus. Nat. Hungarici, 1904 II p. 459.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 546.—Stein, Katalog Paläark, Dipt., 1907 III pp. 669 . 673.—Williston, Manual of North America Diptera, 1908 3rd ed. p. 334.—Coquillett, Proc. U. S. Nat. Mus., 1910 XXXVI No. 1719 p. 561.—Schnabl, and Dziedziicki, Abh. d. Kaiserl. Leop.—Carol. Deutsch. Akad. d. Naturforsch., 1911 XCV Nr. 2 p.

* References are quoted in the text by a number in brackets, which refers to the corresponding number given to the literature cited in the list of references.

141.—Stein, Arch. f. Naturgesch., 1911 Abt. A Heft 1 pp. 111–137.—Stein, Arch. f. Naturgesch., 1914 (1913) Abt. A Heft 8 p. 26.—Stein, Arch. f. Naturgesch., 1916 (1915) Abt. A Heft 10 p. 83.—Johannsen, Trans. Amer. Ent. Soc., 1916 XLII No. 756 p. 391.—Ringdahl, Ent. Tidskr., 1918 XXXIX Haft 2 p. 158.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A. Heft 1 p. 133.—Stein, Arch. f. Naturgesch., 1920 (1919) Abt. A Heft 9 p. 46.—Collin, Ent. Month. Mag., 1921 ser. 3 VII pp. 95–100.—Séguy, Faune de France, Part VI 1923 pp. 195–196.—Karl, Die Tierwelt Deutschlands, T. XIII 1928 pp. 91.92.

Cuculla Robineau-Desvoidy, Essai Myodaires, 1830 p. 523.—Stein, Katalog Paläark. Dipt., 1907 III p. 669.

Aricia Pandellé in part, Revue ent. France, 1899 XVIII p. 115.

The genus *Limnophora* was erected by Robineau-Desvoidy (40) in 1830 for the reception of twenty nominal species, fourteen of which are European and none of which, according to Collin (5), have ever been recognized by subsequent authors.¹ That the generic name is still in good use under these conditions exemplifies in a striking way the peculiar influence that tradition and expediency have exerted.

There have been three types designated for the genus. Robineau-Desvoidy (40) himself did not indicate that any one of the original species might be taken as the type. The species *palustris* is used as a basis for comparative description for others that follow in the list, and on this account might be regarded as a typical species of the genus. But there the matter rests since Robineau-Desvoidy's material has never been examined.

In 1866 Rondani (42) designated *Anthomyia compuncta* Wiedemann as the type of *Limnophora*, a species not included in the original series by Robineau-Desvoidy. Rondani evidently followed Macquart's (23) prior list of 1835 inasmuch as he repeats the names of the few original species belonging to the genus before citing *compuncta*. He apparently did not recognize any of the former species to warrant a type designation from

¹ Villeneuve and Séguy have also assured me by correspondence that the original material has never been recognized as such, and so far as they know it is not in existence.

among them. Both Meade (33) and Osten Sacken (36) record the statement that *Anthomyia compuncta* Wied. is the type of *Limnophora*.

In 1910 Coquillett (12) designated *Limnophora palustris* Robineau-Devoidy as the type, the second species from the original series and the first of those recorded by Macquart and Rondani. It is very doubtful whether, under the circumstances, Coquillett had any definite knowledge regarding the identity of *palustris*. The most helpful opinion about the matter is given by Collin (5), who bases the appearance of the type on a comparison with the generic description. I can scarcely accept such an assumption regarding the identity of the species as proof of the genus.

In 1928 Karl (19) designated *Musca notata* Fallen² as the type of the restricted genus *Limnophora* of recent authors, which species thereby becomes the type of the genus *Limnophora sens.-lat.* However, as in the previous case of Rondani's designation, neither *compuncta* nor *notata* is included in the original series of species belonging to the genus, and hence their designation is invalid according to the rules of the International Committee on Nomenclature.

In conclusion, it may be said that in so far as a study of the literature reveals there has been no valid type designation that would fix the identity of the genus, largely, it is presumed, because none of the original species mentioned by Robineau-Desvoidy has been known to be available for study. Their existence appears to have ceased with the publication of their names. The permanent status of the generic name *Limnophora* will largely depend on fixing the type of the genus. It is to be hoped that whatever be the ultimate decision concerning the matter by fellow workers or by any authorized body due regard will be given to the feasibility of retaining the present generic name.

² Mr. Karl explains in a recent letter that the species denoted by him as "*typische art*" should be regarded as representative species for the group, his purpose being to suggest the name of well known species whereby students might be able the more readily to recognize the various groups. This did not necessarily involve the designation of the type species.

The genus *Limnophora sens.-lat.* contains numerous species from North America, many of which have been allotted to various genera at different times.

In 1835 Macquart (23) added nine European species to the original number, including *compuncta* Wiedemann and *triangula* Fallen of North American occurrence. The well known European species *Musca notata* Fallen was included by Macquart in his newly formed group *Spilogaster*. Schiner (44), Rondani (42), and Meade (34), followed Macquart's classification. but transferred the species *triangula* to the genus *Cænosia*.

In 1889, 1890, and 1902, Schnabl (45) (46) (47), presented contributions concerning the limitations of certain allied groupings, in which he restricts the use of the generic name to certain species of which *notata* and *triangula* are representative. In the light of more recent work, it appears that Schnabl's concept regarding the limitations of the groups are well founded, although from his own diagnostic descriptions such is difficult to interpret. He introduces the use of the male genitalic characters to confirm the contention of Strobl that the species included by him in the new genus *Pseudolimnophora* (61) are more closely related to *Limnophora* than to *Cænosia*, the commonly accepted genus at this time.

In 1911 Schnabl and Dziedzicki (49) produced their great work, *Die Anthomyiden*, in which the genus *Limnophora* is divided into seven subgenera, four of which occur in North America, namely, *Limnophora sens.-str.*, *Leucomelina* Macquart, *Brontæa* Kowarz, and the new subgenus *Spilogona*. The classification of the group is based largely on the more or less arbitrary nature of the characters exhibited by the shape of the genitalic appendages in the male sex. No types are designated.

Meanwhile in 1899 Pandellé (37) had retained the old group name *Aricia* to include four subgenera, including *Aricia*, *Spilogaster*, and *Limnophora*. To the two former segregates he imparts the species *notata* Fallen and *carbonella* Zetterstedt respectively. It is evident in glancing through the list of species that Pandellé's treatment of the various categories embraced something much wider in its application than what is credited to such rankings as genus and subgenus today.

Stein (55) (56) (57) (58) (59) in all his contributions to the faunal studies of the world has regarded the genus in its broadest meaning, not recognizing many of the lesser segregates of Schnabl and Dziedzieki, nor the limnophorine genera of Rondani and Strobl. He follows the traditional treatment of the genus, reserving it for such species as possess the following combination of characters: Abdomen invariably marked by paired subtriangular areas, male genitalic appendages not prominent, thorax with two pairs of presutural dorsocentral bristles, and with the sternopleural bristles not arranged in an equilateral triangle, prealar bristle absent, antennæ with bare or finely pubescent arista, hind tibia with no bristles on posterodorsal surface. Ringdahl (39) has followed Stein in the treatment of the Swedish forms of *Limnophora*. This generic concept forms the basis for the present classification of the species from North America.

In 1918 and 1921 Malloch (26) (28) unintentionally redefined Schnabl and Dziedzieki's conception of the subgenus *Limnophora*, with possibly minor differences, raising the group to full generic rank. He based his conception of the genus on an entirely new set of delimiting characters. The large number of species formerly accredited to the genus he (28) placed under the generic name *Melanochelia* Rondani, a mistake for the name *Spilogona*, as later recognized by him (31).

In 1921 Collin (5), working independently, also redefined the segregates comprising the genus, using identically the same characters introduced by Malloch to restrict the group *Limnophora*, namely the presence of hairs along the lateral margins of prosternum and base of vein *R.* 4+5. In addition Collin attempted to fix the segregates by depicting the probable nature of *palustris* Robineau-Desvoidy, and by designating *compuncta* Wiedemann as the type of *Spilogona*. In treating of the European genera I have generally accepted the synonymy indicated by Collin.

Séguy (51) in 1923 and Karl (19) in 1928 used the characters adopted by Malloch and Collin to classify the species of *Limnophora sens.-lat.* occurring in France and Germany respectively.

There are four nominal genera described from North America which are closely related to the genus *Limnophora*.

In 1913 Malloch (25) described the genus *Paralimnophora* for the reception of the single new species, *P. brunnesquama* (= *narina* Walker), the specimens being taken in New Hampshire, New Brunswick, and Quebec. Stein (59) has pointed out that the generic name is preoccupied. There appear to be no characters of sufficient significance to warrant the separation of the genus from *Spilogona*.

In 1918 Malloch (26) introduced the new genus *Bucephalomyia* with the species *Tetramerinx femorata* Malloch as type.

In 1919 Aldrich (2) erected the genus *Sphenomyia* for the reception of the single new species, *S. kincaidi*, taken in Alaska. There are two species referable to this genus, *kincaidi* and *biquadrata* (Walker). The males resemble those of *Spilogona leucogaster* (Zetterstedt), differing generically in that the wing vein *R*. 4+5 has a few setulae towards base.

In 1920 Malloch (27) described the two genera *Eulimnophora* and *Lispoides*, with the types *Limnophora arcuata* Stein and *Limnophora æquifrons* Stein respectively, both species being of wide distribution in North America. The former genus is now considered by Malloch (32) as a synonym of *Gymnodia* Robineau-Desvoidy.

I have refrained from including Schnabl's genus *Limnospila* (48), containing the single palaearctic species *L. albifrons* (Zetterstedt), as a component part of *Limnophora*, despite the fact that the species naturally belongs to the *Limnophorinæ* rather than the *Cænosiinæ*, because I am not certain regarding the relationship of the genus to other genera, such as *Tetramerinx* Berg. Artificially the genus may be separated from *Limnophora* by the position of the sternopleural bristles, which are situated in the form of an equilateral triangle, as in *Tetramerinx*. I am inclined to believe that this single character can no longer serve the purpose of delimiting the *Cænosiinæ* from the *Limnophorinæ*.

The first formal attempt to list the North American species belonging to the genus *Limnophora sens.-lat.* was in 1878 when Osten Sacken published his catalogue of North American diptera. The family *Anthomyiidae* contained largely the names of Walker's species from Canada and the United States, those of Loew's from North America, the determinations of material sent

by Professor Hagen of the Museum of Comparative Zoology, Cambridge, to Mr. Meade in England, and of records of species mentioned by Holmgren (15) as occurring in Greenland. There are eleven or twelve nominal species listed, which are scattered among the genera *Aricia*, *Eriphia*, *Hylemyia*, *Limnophora*, and *Anthomyia*.

In 1898 Stein (54), working on the collections of Hough, Aldrich, Johnson, and Nason, recorded six species of *Limnophora*, and in 1920 (60), with a second consignment of material from Aldrich, Johannsen, Bradley, and Melander before him, recognized eighteen additional species, and gave a key to twenty-one North American forms.

In 1905 Aldrich (1) published his catalogue of North American diptera, which not only incorporated the records of Osten Sacken, but also brought together the faunal lists of Slosson (52), Bigot (3), Williston (64), Coquillett (9), and Stein (54), besides the Mexican records of Giglio-Tos (15), and Van der Wulp (62). Excluding the Mexican species, there are seventeen species listed in *Limnophora*, one in *Cænoscia*, and three in *Spilogaster*, making a total of twenty-one species.

In 1921 Malloch (28) published his keys to the genera *Melanocheilia* (Malloch not Rondani) and *Limnophora sens.-str.*, recording therein many of the species described by him. In the former group there are twenty-four species included, whilst in the latter four.

More recently Johnson (18) has listed seventeen species from New England, included in the groups *Lispoides*, *Limnophora*, *Spilogona*, and *Paralimnophora* Malloch; and Leonard (21) has recorded fifteen species in the New York State list of insects.

In the following pages there are listed the records of eighty-one species and two varietal forms. Mr. Collin (6a) has recorded twelve additional species occurring in Greenland, which I have not been able to examine; likewise there are the records of five more species from North America which I am unable to verify owing to the fact that the material has not been available for study. In all there must be about one hundred species so far recognized as occurring in North America.

Of the species that have been studied there are three in *Limnophora*; two in *Pseudolimnophora*; two in *Sphenomyia*; one

in *Bucephalomyia*; one in *Lispoides*; three in *Gymnodia*; and sixty-eight species and two varieties in *Spilogona*. Of these, thirty-four constitute additional records for North America, and twenty-nine are described as new to science.

KEY TO SUBGENERA

1. Vein *R.* 4+5 with a few setulæ at base on dorsal or ventral surface of wing 2
- Vein *R.* 4+5 with no setulæ at base on dorsal or ventral surface of wing 5
2. Prosternum with a series of hairs along lateral margins 3
- Prosternum with no series of hairs along lateral margins 4
3. First abdominal sternum with no setulæ.

Limnophora Robineau-Desvoidy

- First abdominal sternum with setulæ *Pseudolimnophora* Schnabl.

4. Frontal vitta with a black polished triangular area, small and confined to vicinity of ocellar triangle in male, large and extending to base of antennæ in female; sternopleural bristles arranged in the order 1:1; hind tibia with an apical anterodorsal bristle *Sphenomyia* Aldrich

- Frontal vitta pollinose, with no polished triangular area; sternopleural bristles arranged in the order 1:2; hind tibia with no apical anterodorsal bristle *Bucephalomyia* Malloch

5. Parafrontal setulæ descending on parafacials to a level below that of base of third antennal segment *Lispoides* Malloch

- Parafrontal setulæ not descending on parafacials to a level below that of base of third antennal segment 6

6. First abdominal sternum bare *Spilogona* Schnabl and Dziedzicki

- First abdominal sternum with a few setulæ 7

7. Eyes abnormally large and expansive when viewed in profile, reducing the parafrontals, parafacials, and caudal half of cheeks to lineal proportions; abdominal marks arcuate in outline; hind tibia with apical anterodorsal bristle absent *Gymnodia* Robineau-Desvoidy

- Eyes not restrictive of other parts of head owing to their abnormal size when viewed in profile; abdominal marks subtriangular or spherical in outline; hind tibia with apical anterodorsal bristle present.

Spilogona Schnabl and Dziedzicki

Subgenus *Limnophora* Robineau-Desvoidy

Limnophora Schnabl and Dziedzicki, Abh. d. Kaiserl. Leop.-Carol. Deutsch. Akad. d. Naturforsch., 1911 XCV Nr. 2 pp. 141. 151.—Malloch, Trans. Amer. Ent. Soc., 1918 XLIV No. 782 p. 274.—Malloch, Canad. Ent., 1921 LIII pp. 61. 64.—Malloch, Ann. Mag. Nat. Hist., 1921 ser. 9 VII p. 165.—Collin,

- Ent. Month. Mag., 1921 ser. 3 VII pp. 96 . 243.—Séguy, Faune de France, Part VI, 1923 pp. 196 . 199.—Malloch, Entomol. Mitteilung., 1928 Bd. XVII Nr. 4 p. 290.—Karl, Die Tierwelt Deutschl., T. XIII 1928 pp. 92 . 94.
- Leucomelina Macquart, Dipt. Exot., Suppl. 4, 1850 p. 234.—Bigot, Ann. Soc. Ent. France, 1883 (1882) ser. 6 XII p. 19.—Bigot, Ann. Soc. Ent. France, 1885 (1884) ser. 6 XIV p. 263.—Giglio-Tos, Boll. Mus. Zool. Anat. Comp. Univ. Torino, 1893 VII No. 147 p. 7.—Giglio-Tos, Ditteri del Messico, 1895 Pt. IV p. 18.—Van der Wulp, Biolog. Centr.-Americ., 1896 II p. 326.—Aldrich, Misc. Coll. Smiths. Inst., 1905 XLVI No. 1444 p. 548.—Williston, North American Diptera, 1908 3rd ed. p. 334.—Coquillett, Proc. U. S. Nat. Mus., 1910 XXXVII No. 1719 p. 560.—Schnabl and Dziedzicki, Abh. d. Kaiserl. Leop.-Carol. Deutsch. Akad. d. Naturforsch., 1911 XCV Nr. 2 pp. 141-150.—Malloch, Ent. News, 1921 XXXII p. 43.

The restriction of the genus *Limnophora* Robineau-Desvoidy to a more specific grouping of the species was first attempted by Schnabl (45) in 1889, to be followed by further contributions on the problem in 1890 (46) and 1902 (47). In 1911 Schnabl and Dziedzicki (49) published their important work, *Die Anthomyiden*, in which the relationship of the various segregates of *Limnophora* is set forth at some length. The group concepts were largely based on a series of arbitrary characters of which that of the male genitalia formed an important contribution. Fifteen European species and one varietal form are included in the subgenus *Limnophora*, most of which had heretofore been recorded by authors in such genera as *Limnophora sens.-lat.*, *Spilogaster*, *Aricia*, and *Cœnosia*. No type was designated for the new subgenus.

In 1918 and 1921 Malloch (28) redefined the group on the basis of an entirely new set of characters, restricting the group to those species with setulæ at base of vein *R*. 4+5, and with a series of hairs along lateral margins of prosternum. His concept of the group approaches that of Schnabl and Dziedzicki.

In 1921 Collin (5), working independently, used almost the same identical characters introduced by Malloch to classify the British species of *Limnophora*. He records Coquillett's prior

designation of *Limnophora palustris* Robineau-Desvoidy as type of the genus, and depicts the probable appearance of this species by a reference to the generic description of Robineau-Desvoidy.³ Séguy (51), with minor changes, followed Collin in the classification of the French species of *Limnophora*.

In 1928 Karl (19) designated the well known European species *Musca notata* Fallen as type of the subgenus *Limnophora*. This species conforms to the concept of the segregate as outlined by Schnabl and Dziedzicki, Malloch, and Collin according to Dr. J. M. Aldrich,⁴ but whether the species is conspecific with any of Robineau-Desvoidy's original species, including *palustris*, it is impossible to say definitely.⁵

In 1850 Macquart (24) established the genus *Leucomelina*, with the new Brazilian species *Leucomelina pica* as type. In his description of the genus Macquart drew attention to the character of vein *M.* 1 + 2, which he described as curved at apex, thus restricting the cell *R.* 5 at margin of wing. In 1885 Bigot (3) came to the conclusion that there was very little evidence for the retention of Macquart's genus, and favored its suppression and union with *Limnophora sens.-lat.* In 1893 and 1895 Giglio-Tos (13) described three additional Mexican species, and in 1896 Van der Wulp (62) revised the genus as restricted to Mexico, characterizing the genus as possessing the vein *M.* 1 + 2 distinctly curved at apex, in contrast to the entirely straight vein in *Limnophora*. In 1911 Schnabl and Dziedzicki (49) maintained the group as a subgenus of *Limnophora sens.-lat.*, separating it from *Limnophora sens.-strat.* by the distal curvature of vein *M.* 1 + 2. Stein (59), in listing the genera of the world, recorded the species of *Leucomelina* described by Macquart and Giglio-Tos among those of *Limnophora sens.-lat.*

Malloch (29), in re-examining Van Der Wulp's species, recognized the congeneric relationship between *Leucomelina* and *Limnophora* as restricted by him. He stated further that the *Limnophora* of Van Der Wulp contained three species that belong

³ I have already discussed the problem concerning the designation of not only this species but also that of *Musca notata* Fallen as types of *Limnophora* on page 29.

⁴ From an unpublished manuscript.

⁵ From correspondence with Dr. J. Villeneuve.

to Leucomelina, species which in common with many of those in Europe and North America have not the vein *M.* 1 + 2 curved forward at apex.

Numerous authors (44) (43) (34) (61) (37) have followed Macquart (23) in using the loosely constructed genus *Spilogaster* for the reception of one or more species of *Limnophora sens.-lat.*, notably in the case of *Musca notata* Fallen. Westwood (63) has designated *Musca quadrum* Fabricius as the type of the genus, a species which has been included by recent European workers in the genus *Helina* Robineau-Desvoidy.

Diagnostic characters:—Wing with a few setulæ at base of vein *R.* 4 + 5; prosternum with a series of hairs along lateral margins; first abdominal sternum with no setulæ; hind tibia with apical anterodorsal bristle lacking.

KEY TO SPECIES

1. Males 2
- Females 3
2. Eyes separated by a distance less than that between cephalic pair of parafrontal bristles; parafrontals with a series of bristles confined to cephalic half, and with a distinctive pair of setulose bristles adjacent the anterior ocellus: presutural acrosticals arranged in three or four irregular series: vein *M.* 1 + 2 curved more or less forward at apex, thereby narrowing the cell *R.* 5 at wing margin *narona* Walker
- Eyes separated by a distance greater than that between cephalic pair of parafrontal bristles, the latter weakly developed, and continued in an uninterrupted series to vertex: presutural acrosticals arranged in two irregular series: vein *M.* 1 + 2 straight to wing margin *discreta* Stein
3. Parafrontals at level of anterior ocellus narrower than distance between posterior ocelli: scutellum with a median brownish mark: vein *M.* 1 + 2 curved more or less forward at apex, thereby narrowing the cell *R.* 5 at wing margin *narona* Walker
- Parafrontals at level with anterior ocellus broader than distance between posterior ocelli: scutellum entirely grayish: vein *M.* 1 + 2 straight to wing margin 4
4. Mid tibia with a median anterodorsal bristle *groenlandica* Malloch
- Mid tibia with no median anterodorsal bristle *discreta* Stein

Limnophora (*Limnophora*) *narona* (Walker)

Anthomyia narona Walker, List Dipt. Brit. Museum, 1849 IV p. 945.—Osten Sacken, Misc. Coll. Smithsn. Inst., 1878 III p. 169.—Johnson, Proc. Acad. Nat. Sci. Phila., 1895 XLVII p. 336.

- Anthomyia prominula* Thomson, Dipt. Eug. Resa, 1868 p. 550.
- Homalomyia dentata* Bigot, Ann. Soc. Ent. France, 1885 (1884) ser. 6 IV p. 284. Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 538.
- Limnophora cyrtoneurina* Stein, Berl. Ent. Zeitschr., 1898 (1897) XLII p. 203.—Coquillett, Dipt. Invert. Pacif., 1904 I p. 33.
- Limnophora narona* Stein, Zeitschr. f. Hymen. u. Dipt., 1901 I Heft 4 p. 202.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 547.—Smith, Ann. Rept. N. J. State Mus. 1909, 1910 p. 791.—Stein, Arch. f. Naturgesch., 1911 Abt. A Heft 1 p. 132.—Johnson, Bull. Amer. Mus. Nat. Hist., 1913 XXXII Art. 3 p. 76.—Malloch, Trans. Amer. Ent. Soc., 1918 XLIV No. 782 p. 274.—Stein, Arch. f. Naturgesch., 1920 (1918) Abt. A Heft 9 pp. 47. 56.—Britton, Bull. 31 Conn. Geol. Nat. Hist. Surv., 1920 p. 198.—Malloch, Canad. Ent., 1921 LIII p. 64.—Cole and Lovett, Proc. Cal. Acad. Sci., 1921 XI No. 15 p. 311.—Johnson, Occ. Pap. Boston Soc. Nat. Hist., 1925 No. VII p. 229.—Huckett, Mem. 101 N. Y. (Cornell) Agric. Exp. Station, 1928 (1926) p. 834.
- Limnophora prominula* Thomson, Wien Ent. Zeitg., 1910 XXIX Heft 2 and 3 p. 67.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 136.
- Limnophora dentata* Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 134.

RECORDS:—

- Florida, 1 ♀, Palatka, May 3-4, 1916; 1 ♂, 4 ♀, Lakeland, May 6, 1916. (J. C. Bradley).
- Georgia, 2 ♂, 1 ♀, Spring Creek, Decatur Co., July 16-29, 1912; 3 ♂, 6 ♀, Billy's Island, Okefenokee Swamp, June, 1912.
- Tennessee, 1 ♂, Roan Mt., Carter Co., August 10, 1922. (T. H. Hubbell).
- Nevada, 1 ♀, Indian School, Pyramid Lake, July, 1911. (J. M. Aldrich).
- New Mexico, 1 ♀, Socorro,—(S. W. Williston): 1 ♂, 1 ♀, Las Cruces, June 15, 1917.
- California, 1 ♂, Los Angeles, Aug. 3- . (J. M. Aldrich): 2 ♂, Berkeley, Sept. 16, 1906: 1 ♂, Berkeley Hills, 500-1000 ft. Sept. 9, 1907; 1 ♂, Mesa Grande, Russian R., Sept. 30, 1906;

1 ♂, 1 ♀, Sisson, Aug. 14, 1908. (J. C. Bradley); 1 ♀, Fresno, Nov. 15, 1922. (E. Phillips): 1 ♀, Stanford U., Dec. 29, 1897; 2 ♀, Portola, Sept. 5, 1917. (Cornell U. Exped.) 1 ♂, Samoa Beach and Dunes, Humboldt Co., June 18, 1907.

Oregon, 1 ♂, Hermiston, July 9, 1922.

Washington, 1 ♀, Lake Chelan, Stehekin, July 30, 1919 (A. L. Melander): 2 ♂, Lake Paha, July 20, 1920; 1 ♂, Ritzville, Sept. 9, 1920; 1 ♀, Coulee City, Sept. 3, 1920 (R. C. Shannon).

Idaho, 3 ♂, Soldier Creek, Priest Lake, Aug. 22, 1919; 1 ♂, Potlatch, Sept. 20, 1919 (A. L. Melander).

Alberta, 1 ♀, Banff, Aug. 5, 1925 (Owen Bryant).

Illinois, 1 ♀, Muncie, May 29, 1919.

New York, 1 ♂, McLean, Sept. 11, 1920; 1 ♂, Ithaca, Aug. 19, 1920; 1 ♂, Ringwood, Ithaca, June 26, 1920; 1 ♂, Michigan Swamp, Tompkins Co., July 12, 1921.

Johnson (17) has considered *Leucomelina garrula* Giglio-Tos as a synonym of *narona*. I have only been able to see a female specimen of *garrula* that has been authentically named, and prefer to leave the matter open until more material is available.

The species is widely distributed throughout the North American continent, specimens having been seen from Mexico, Florida, and Texas; California, Washington, and Oregon; Illinois; New Jersey and New York; the New England States; and Canada. There is a considerable degree of variation according to the localities, but an examination of the genitalic appendages has failed to indicate any significant differences that might justify the separation of the specimens into more than one species.

In a series of specimens from the Okefenokee Swamps of Georgia, the vein *M*. 1 + 2 is very slightly curved at apex and the calyptræ are intensively infuscated. In occasional specimens there are only three pairs of postsutural dorsocentral bristles instead of the normal four pairs.

Limnophora (*Limnophora*) *discreta* Stein

Limnophora discreta Stein, Berl. Ent. Zeitschr., 1898 (1897) XLII p. 204.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 547.—Smith, Ann. Rept. N. J. State Mus. 1909,

1910 p. 791.—Johnson, Bull. Amer. Mus. Nat. Hist., 1913 XXXII Art. 3 p. 76.—Malloch, Trans. Amer. Ent. Soc., 1918 XLIV No. 782 p. 275.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 134.—Malloch, Canad. Ent., 1921 LIII p. 64.—Marchand, Bull. Brooklyn Ent. Soc., 1923 XVIII p. 58.—Johnson, Occ. Pap. Boston Soc. Nat. Hist., No. VII 1925 p. 228.—Huckett, Mem. 101 N. Y. (Cornell) Agric. Exp. Station, 1928 (1926) p. 834.

Limnophora incrassata Malloch, Proc. Cal. Acad. Sci., 1919 ser. 4 IX No. II p. 299.

Leucomelina discreta Cole and Lovett, Proc. Cal. Acad. Sci., 1921 ser. 4 XI No. 15 p. 311.

RECORDS:—

New Mexico, 1 ♂, Socorro—1916 (S. W. Williston).

Nevada, 1 ♀, Ormsby Co., July 6—(Baker).

California, 1 ♂, Los Angeles Co., April; 1 ♂, Fallen Leaf, 6500 ft., July 17, 1917 (J. M. Aldrich).

Oregon, 1 ♀, Hood River, June 8, 1917 (F. R. Cole): 1 ♂, Eagle Creek, Aug. 2, 1921.

Washington, 1 ♀, Entiat, July 26, 1919; 1 ♀, Central Ferry, Sept. 3, 1921; 1 ♀, Paradise Park, Mt. Rainier, Aug., 1921; 3 ♂, Mt. Adams, July 24, 1921; 1 ♂, Lake Stephens, Everett, Aug. 3, 1917; 1 ♂, 1 ♀, Hoods Canal, Potlatch, July 28, 1917; 1 ♂, Van Trump, Mt. Rainier, July 21, 1922; 3 ♂, Shuiskin, Mt. Rainier, July 28, 1922; 1 ♂, Mazama Rdg., Mt. Rainier, July 23, 1922; 1 ♂, Lilliwaup, July 23, 1917. (A. L. Melander): 1 ♀, Lake Paha, Sept. 20, 1920. (R. C. Shannon).

Idaho, 3 ♀, Moscow, Aug. 6, 1912; 1 ♂, — (J. M. Aldrich).

1 ♀, Moscow, June 8, 1921; 2 ♀, Priest Lake, Cavanaugh B., Aug. 18, 19—; 1 ♂, Lake Waha, June 9, 1918 (A. L. Melander): 1 ♂, Mt. Moscow, July, 1922 (J. M. Aldrich).

Alberta, 1 ♀, Banff, July 4, 1925 (Owen Bryant): 1 ♀, Nordegg, July 5, 1921 (J. McDunnough): 1 ♂, Great Slave Lake, N. W. T., Aug., 1925 (J. Russell).

Wyoming, 1 ♀, U. Geyser Basin, Yellowstone Park, Aug. 7, 1918 (A. L. Melander).

Montana, 1 ♀, Summit Sta., 5200 ft. July 25 —.

Utah, 1 ♂, Emigrant Canyon, Wasatch Mts., 7000 ft. July 8, 1911.

Colorado, 1 ♀, Tennessee Pass, July 24, 1917; 1 ♂, 10,240 ft. July 11 — (J. M. Aldrich).

New York, 1 ♂, 1 ♀, Ringwood, Ithaca, June 26, 1920; 1 ♂, July 13, 1920; 1 ♀, June 14, 1920: 1 ♂, Fall Creek, Ithaca, April 26, 1921; 1 ♂, Ithaca, May 23, 1920: 1 ♂, July 1-7 — (J. M. Aldrich). 1 ♂, 3 ♀, Buttermilk, Ithaca, July 10, 1920; 1 ♀, July 18, 1920; 4 ♂, 1 ♀, Coy Glen, Ithaca, June 12, 1920; 1 ♀, Sept. 10, 1920: 1 ♂, Taghanic, Ithaca, July 17, 1920: 1 ♀, Montezuma Marsh, Cayuga Co., July 1, 1920: 1 ♂, Riverhead, L. I., April 21, 1926; 1 ♂, Aug. 20, 1927: 1 ♂, Wantagh, L. I., June 12, 1921: 1 ♂, Hempstead, L. I., April 24, 1921; 1 ♂, June 3, 1921; 1 ♀, June 5, 1921; 1 ♀, April 10, 1921: 1 ♂, Mattituck, L. I., May 20, 1921: 1 ♀, Albany, June 24, 1920: 1 ♀, Shelving Rock Br., Lake George, Sept. 2, 1920 (M. D. Leonard).

New Hampshire, 2 ♀, Franconia, — (Mrs. Slosson).

This species is almost cœxtensive with *narona* in its distribution, having been recorded from Florida and New Mexico; California, Oregon, and Washington; the Rocky Mountain States of Idaho, Montana, Wyoming, and Colorado, and the Canadian Province of Alberta; Illinois; New Jersey, New York, and New England.

I have a large series of specimens before me among which there are occasional specimens with three pairs of postsutural dorsocentral bristles instead of the normal four pairs. In isolated cases there is a slight indication that the vein M. 1+2 is curved at apex. In the males the distance separating the eyes across the frons varies considerably in extent. In none of the female specimens has the mid tibia a median anterodorsal bristle, though in a few specimens the fore tibia possesses a median posterior bristle.

Limnophora (*Limnophora*) *groenlandica* Malloch

Limnophora groenlandica Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 147.—Malloch, Canad. Ent., 1921 LIII p. 64.

The species is recorded from Greenland, being represented only by the female sex. As indicated by Malloch's description and key, the female very closely resembles that of *discreta*.

Subgenus **Pseudolimnophora** Strobl

Pseudolimnophora Strobl, Verh. zool.-bot. Ges. Wien, 1894 (1893) XLIII p. 272.—Coquillett, Journ. N. Y. Ent. Soc., 1901 IX p. 140.—Collin, Ent. Month. Mag., 1921 ser. 3 VII p. 97.—Karl, Tierwelt Deutschlands, T. XIII 1928 p. 94.

Strobilia Pokorny, Verh. zool.-bot. Ges. Wien, 1894 (1893) XLIII p. 541.

Cænusia Meade, Descr. List Brit. Anth., 1897 II p. 74.

Limnophora Schnabl, Hor. Soc. Ent. Ross., 1889 XXIII p. 335.—Schnabl, Hor. Soc. Ent. Ross., 1890 (1889–1890) XXIV pp. 496–500.—Pandellé, Revue ent. France, 1899 XVIII p. 131.—Schnabl, Wien Ent. Zeitg., 1902 XXI Heft 6 p. 133.—Stein, Katal. Paläark. Dipt., 1907 III p. 669.—Coquillett, Proc. U. S. Nat. Mus., 1910 XXXVII No. 1719 p. 596.—Schnabl and Dziedzicki, Abh. d. Kaiserl. Leop.–Carol. Deutsch. Akad. d. Naturforsch., 1911 XCV Nr. 2 p. 152.—Stein, Arch. f. Naturgesch., 1914 (1913) Abt. A Heft 8 pp. 27–28.—Stein, Arch. f. Naturgesch., 1916 (1915) Abt. A Heft 10 pp. 83–111.—Ringdahl, Ent. Tidskr., 1918 XXXIX Heft 2 p. 160.—Stein, Arch. f. Naturgesch., 1920 (1918) Abt. A Heft 9 pp. 46–47.—Séguy, Faune de France, Part VI 1923 p. 199.

The genus *Pseudolimnophora* was erected by Strobl (61) in 1894 for the reception of six nominal species. Later in the same year Pokorny (38) described the genus *Strobilia*, an arbitrary change of name for *Pseudolimnophora*. Pokorny included in this genus the original species listed by Strobl, including *triangula* Fallen and *Limnospila albifrons* Zetterstedt (= *obscuripes* Rondani) of North American occurrence. In 1901 Coquillett (11) designated *Musca triangula* Fallen, the first species of the original series, as the type of *Pseudolimnophora*. In 1921 Collin (5) maintained the group as a subgenus of *Limnophora sens.-lat.*, indicating its relationship to *Limnophora sens.-str.* through the possession of a few setulae at base of vein *R*. 4+5 and the presence of a series of hairs on lateral margins of prosternum.

The species belonging to this group were included in the genus *Cænusia* by earlier European authors, no doubt on account of the widely separated eyes and the strongly developed vertical and ocellar bristles in the male. Later workers transferred the

species *triangula*, *albifrons*, and *nigripes* to the genus *Limnophora sens.-lat.*, chiefly on account of the markings and structure of the abdomen.

Diagnostic characters:—Wing vein *R*. 4 + 5 with a few setulæ at base; prosternum with a series of setulæ along lateral margins; first abdominal sternum with setulæ; hind tibia with apical anterodorsal bristle lacking; eyes in male as widely separated as in female.

***Limnophora* (*Pseudolimnophora*) *nigripes* (Robineau-Desvoidy)**

Limosia nigripes Rob.-Desv., Essai Myod., 1830 p. 541.

Cænosia nigripes Macquart, Hist. Nat. d. Ins., 1835 II p. 349.—Meigen, Syst. Besch., 1838 VII p. 336.—Rondani, Della Soc. Ital. Scienze Naturali, 1866 IX p. 203.—Rondani, Dipt. Ital. Prodr., 1877 VI p. 267.

Limnophora (*Limnophora*) *nigripes* Schnabl, Hor. Soc. Ent. Ross., 1889 XXIII p. 335.—Séguy, Faune de France, Part VI 1923 p. 202.

Limnophora nigripes Stein, Arch. f. Naturgesch., 1914 (1913) Abt. A Heft 8 p. 29.—Stein, Arch. f. Naturgesch., 1916 (1915) Abt. A Heft 10 p. 105.—Ringdahl, Ent. Tidskr., 1918 XXXIX p. 160.—Stein, Arch. f. Naturgesch., 1920 (1918) Abt. A Heft 9 pp. 47. 57.—Ringdahl, Tromsø Museums Årshefter, 1928 (1926) XLIX No. 3 p. 28.

Limnophora (*Pseudolimnophora*) *nigripes* Collin, Ent. Month. Mag., 1921 ser. 3 VII p. 241.—Karl, Tierwelt Deutschlands, Th. XIII 1928 p. 94.

Pseudolimnophora nigripes Collin, Trans. Ent. Soc. London, 1930 LXXVIII Pt. 2 p. 277, pls. 17. 24.

RECORDS:—

Alaska, 3 ♂, 3 ♀, Naknek Lake, Savonoski, June, 1919: 5 ♂, 2 ♀, July, 1919: 5 ♂, 1 ♀, July 27, 1919: 1 ♂, July 28, 1919: 1 ♀, July 31, 1919: 1 ♂, Aug. 1, 1919: 1 ♀, Aug., 1919. (Jas. S. Hine)

British Columbia, 1 ♂, Oliver, April 27, 1923. (C. B. D. Garrett) 1 ♀, Agassiz, June 11, 1926. (H. H. Ross)

Alberta, 1 ♂, Nordegg, July 5, 1921. (J. McDunnough)

Washington, 3 ♂, Oroville, — ; 1 ♂, Kamiac Buttee, —. (A. L. Melander.

Ontario, 1 ♂, Lake Abitibi, Low Bush, June 7, 1925; 2 ♂, Aug. 8, 1925; 1 ♀, Aug. 1, 1925. (N. K. Bigelow). 1 ♀, Ottawa, May 18, 1927. (C. H. Curran). 1 ♀, Ottawa, July 21, 1914. (G. Beaulieu)

I am of the opinion that all the above specimens represent a single species despite a marked degree of variation, notably in the number of postsutural dorsocentral bristles and in the bristling of the mid tibia. Three male specimens from Alaska and one from British Columbia have three pairs of postsutural dorsocentral bristles, and five males and one female specimen from Alaska have four postsutural dorsocentral bristles on one side and three on the other, the so-called second bristle being very weak. The mid tibia possesses one to three posterior bristles, the number frequently varying in a single specimen.

A second species belonging to the group, namely *triangula* Fallen, has been recorded by Lundbeck (22) as occurring in Greenland. This species is distinguished in part from *nigripes* by the presence of three pairs of postsutural dorsocentral bristles, and by having one posterior bristle on mid tibia, characters which I am unable to appraise correctly owing to the variation shown by the above specimens.

Limnophora (*Pseudolimnophora*) *triangula* (Fallen)

Musca triangula Fallen, Dipt. Suec., Muscides, 1825 II p. 74.

Anthomyia triangula Meigen, Syst. Besch., 1826 V p. 148.

Limnophora triangula Macquart, Hist. Nat. d. Ins., 1835 II p. 311.—Stein, Katal. Paläark. Dipt., 1907 III p. 675.—Stein, Arch. f. Naturgesch., 1914 (1913) Abt. A Heft 8 p. 28.—Stein, Arch. f. Naturgesch., 1916 (1915) Abt. A Heft 10 p. 111.—Ringdahl, Ent. Tidskr., 1918 XXXIX p. 160.

Anthomyza triangula Zetterstedt, Ins. Lapp., 1838 p. 685.

Aricia triangula Zetterstedt, Dipt. Scand., 1845 IV p. 1482.

Cœnosia triangula Schiner, Fauna Austr., 1862 I p. 664.—Meade, Ent. Month. Mag., 1883 XX p. 105.—Meade, Deser. List Brit. Anth., 1897 II p. 74.—Van Der Wulp, Tijdschr. v. Entom., 1898 XLI p. 107.—Lundbeck, Videns. Medd. Nat. Foren.

Kjöben., 1901 (1900) ser. 6 II p. 289.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 562.

Limnophora (*Limnophora*) *triangula* Schnabl, Hor. Soc. Ent. Ross., 1889 XXIII p. 335.—Schnabl and Dziedzicki, Abh. d. Kaiserl. Leop.-Carol. Deutsch, Akad. d. Naturforsch., 1911 XCV Nr. 2 p. 152.—Séguy, Faune de France, 1923 Part VI p. 205.

Pseudolimnophora triangula Strobl, Verh. zool.-bot. Ges. Wien, 1894 (1893) XLIII p. 272.—Coquillett, Journ. N. Y. Ent. Soc., 1901 IX p. 140.—Collin, Trans. Ent. Soc. London, 1930 LXXVIII Pt. 2 p. 277, pls. 17-24.

Strobilia triangula Pokorný, Verh. zool.-bot. Ges. Wien, 1894 (1893) XLIII p. 541.

Aricia (*Limnophora*) *triangula* Pandellé, Revue ent. France, 1899 XVIII p. 131.

Limnophora (*Pseudolimnophora*) *triangula* Collin, Ent. Month. Mag., 1921 ser. 3 VII p. 242.—Karl, Tierwelt Deutschlands, Th. XIII 1928 p. 94.

This species has been recorded by Lundbeck (22) from Greenland. According to many European authors the species may be separated from *nigripes* by the possession of only three pairs of postsutural dorsocentral bristles. Among the specimens recorded as *nigripes* there are a few with three pairs of postsutural dorsocentral bristles, but I am of the opinion that this number represents a variation within the species rather than a specific character.

There is apparently a considerable degree of confusion in the literature concerning the identity of the species. Stein (56) in 1907 listed *nigripes* Robineau-Desvoidy as a synonym of *triangula* Fallen, and *Cænusia triangula* of Rondani as a synonym of *pacifica* Schiner not Meigen (= *pollinifrons* Stein). Strobl (61) in 1894 listed *Cænusia nigripes* Macquart not Robineau-Desvoidy as a synonym of *triangula* Fallen. In 1916 Stein (58) recognized *nigripes* Robineau-Desvoidy and *triangula* Fallen as distinct species.

Subgenus **Sphenomyia** Aldrich

Sphenomyia Aldrich, Proc. Ent. Soc. Wash., 1919 XXI No. 5 p. 108.—Seamans, Canad. Ent., 1926 LVIII p. 175.

The genus *Sphenomyia* was described by Aldrich (2) in 1919 for the reception of one species, *kincaidi* new. In 1926 Seamans (50) added another species to the genus, *banffi* new. In general characteristics this group is much more closely allied to those lacking the setulæ at base of vein *R.* 4 + 5 than to those possessing such.

Diagnostic characters:—Wing vein *R.* 4 + 5 with setulæ towards base; prosternum with no series of setulæ along lateral margins; hind tibia with an apical anterodorsal bristle; frontal vitta with a black polished triangular area, small and confined to the vicinity of ocellar triangle in male, large and extending to base of antennæ in female; sternopleural bristles arranged 1:1.

KEY TO FEMALES

1. Halteres yellowish, at most tinged with purple; ovipositor very much flattened laterally *biquadrata* Walker
- Halteres black; ovipositor not markedly flattened laterally. *kincaidi* Aldrich

Limnophora (*Sphenomyia*) *biquadrata* (Walker)

Eriphia biquadrata Walker, List Dipt. Brit. Mus., 1849 (1848) IV p. 963.—Osten Sacken, Misc. Coll. Smithsn. Inst., 1878 III p. 167.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 535.

Limnophora biquadrata Stein, Zeitschr. f. Hymen, u. Dipt., 1901 I Heft 4 p. 189.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 546.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 134.

Sphenomyia banffi Seamans, Canad. Ent., 1926 LVIII p. 175.

Male: Head with parafrontals and parafacials silvery pruinulent, cheeks less highly so; frontal vitta black with trace of whitish pruinescence; antennæ and palpi black, third antennal segment with trace of pruinescence; frontal triangle and proboscis polished. Thorax entirely black, shining, with trace of brownish pruinescence. Abdomen with terga 1 + 2 largely blackened, dorsum of terga 3, 4, and 5 silvery pruinulent, terga 3 only with a pair of black subquadrate marks. Ventral surface of abdomen blackish subshining. Legs black. Wings hyaline; calyptre whitish with yellow margins; halteres yellowish brown, tinged with purple.

Eyes large, with a few hairs, separated by a distance equal to that between posterior ocelli; frontal vitta gradually narrowed caudad to lineal dimensions; parafrontal bristles continued in series caudad to level of frontal triangle; parafacials, at base of antennæ, and cheeks narrower than breadth of third antennal segment; bristles and setulæ confined to ventral border of cheeks; arista minutely pubescent. Thorax with numerous fine setulæ; acrosticals setulose; postsutural dorsocentral bristles four pairs; scutellum with a few setulose hairs on lateral declivities; mesopleural series of bristles with an intermediate predorsal bristle; sternopleural bristles, 1:1.

Abdomen ovate, depressed; tergum 3 with a pair of narrowly separated subquadrate marks, restricted to mesal third of tergum; terga 4 and 5 unmarked; sternum 5 with a few fine setulæ, and with 2 or 3 fine bristles towards apex or processes.

Fore tibia with no posterior median bristle; mid femur with a series of weak bristles on proximal half of anteroventral surface, and a series of longish bristles on proximal half of posteroventral surface; mid tibia with 2 posterior bristles; hind femur with 3 or 4 bristles on distal half of anteroventral surface, with no bristles on proximal half of posteroventral surface; hind tibia with 1 or 2 anteroventral, 2 or 3 anterodorsal, and 1 or 2 weaker posterior bristles.

Wings with costal thorns small; veins *R.* 4+5 and *M.* 1+2 gradually divergent toward wing margin. Length, 5.25 mm.

RECORDS:—

British Columbia, 1 ♂, Oliver, April 27, 1923; 1 ♂, May 28, 1923. (C. B. D. Garrett)

Alberta, 1 ♀, Banff, June 16, 1922. (C. B. D. Garrett)

Wyoming, 1 ♀, Canyon Camp, Yellowstone Park, Aug. 12, 1918. (A. L. Melander)

Manitoba, 1 ♂, 1 ♀, Victoria Beach, Aug. 8, 1926. (G. S. Brooks) 1 ♀, Stony Mountain, Aug. 9, 1923. (J. B. Wallis)

Ontario, 1 ♂, Macdiarmid, Lake Nipigon, June 11, 1922; 1 ♀, Lake Abitibi, Low Bush, June 10, 1925. (N. K. Bigelow)

1 ♂, Ottawa —.

I feel confident that the above males and females are conspecific, despite the fact that they exhibit a marked case of

sexual dimorphism. The male of *biquadrata* has a silvery pruinose abdomen, whereas in the female the abdomen is entirely black and highly shining. A male specimen was sent to Mr. J. E. Collin for comparison with Walker's type in the British Museum, who reported that, in his opinion, the specimens were identical.

Limnophora (Sphenomyia) kincaidi (Aldrich)

Sphenomyia kincaidi Aldrich, Proc. Entom. Soc. Wash., 1919 XXI No. 5 p. 108.

RECORDS:—

Alaska, 1 ♀, Bering Sea, July, 1913. (F. Johansen)

The females of *kincaidi* may be readily distinguished from those of *biquadrata* by having the halteres blackened and not yellowish. In both species the ovipositor is armed with coarse spinules on anal plates, the scutellum has a number of setulose hairs on lateral declivities, and the mesopleural series of bristles possesses an intermediate predorsal bristle.

Subgenus **Bucephalomyia** Malloch

Bucephalomyia Malloch, Trans. Amer. Ent. Soc., 1918 XLIV No. 782 p. 273.

The genus *Bucephalomyia* was proposed by Malloch (26) in 1918 for the reception of one species, *Tetramerinx femorata* Malloch. The genus is allied to *Pseudolimnophora* in that the vein *R*. 4+5 has a few setulæ at base, the abdomen has broad subtriangular marks, the legs are weakly and sparsely bristled, and the eyes in the male are broadly separated. However in *Pseudolimnophora* the prosternum has a series of setulose hairs along lateral margins, whereas in *Bucephalomyia* the prosternum is bare.

Diagnostic characters:—Vein *R*. 4+5 of wing with setulæ toward base; prosternum with no series of setulose hairs along lateral margins; first abdominal sternum bare; frontal vitta pollinose, with no polished frontal triangle; hind tibia with no apical anterodorsal bristle; sternopleural bristles arranged 1 : 2.

Limnophora (Bucephalomyia) femorata (Malloch)

Tetramerinx femorata Malloch, Proc. U. S. Nat. Mus., 1913 XLV No. 2004 p. 603.—Malloch, Canad. Ent., 1917 XLIX p. 226.

Bucephalomyia femorata Malloch, Trans. Amer. Ent. Soc., 1918 XLIV No. 782 p. 273.

Limnophora femorata Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 135.

This species has been recorded from Los Angeles, California, and from Alamogordo, New Mexico, and constitutes the sole representative of the subgenus. The species, except for the characteristic triangular markings on the abdomen, is strikingly different from those of other subgenera belonging to *Limnophora sens. lat.*, resembling in many respects those species found in such associated genera as *Tetramerinx*, *Phyllogaster*, or *Pseudocœnosia*.

The head in male and female is dichoptic, with silvery pruinescence, the antennæ and arista are elongated, tachinidlike, the ocellar and vertical bristles in both sexes are robust, the oral margin is not produced; the legs are weakly and sparsely bristled, and the hind tibia lacks the apical anterodorsal bristle. Further, in the male the hind coxæ have each two stubby spines at apex (ventrad), whilst in the female the mid coxæ have each a stout recurved spine; in the male the hind femur has a fasciculus of short spines at base of ventral surface which is absent in the female; the anal plates of ovipositor possess setulose hairs only.

Subgenus *Lispoides* Malloch

Lispoides Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 146.—Malloch, Canad. Ent., 1921 LIII p. 61.

The genus *Lispoides* was erected by Malloch (27) in 1920 for the reception of a single species, *Limnophora æquifrons* Stein. The subgenus differs essentially from its allies in that the parafacial setulæ are continued ventrad onto the dorsal region of parafacials.

Diagnostic characters:—Wing vein *R*. 4+5 with no setulæ toward base; prosternum with no series of setulæ on lateral margins; first abdominal sternum hairy; dorsal half of parafacials clothed with a few setulose hairs.

Limnophora (*Lispoides*) *æquifrons* Stein

Limnophora æquifrons Stein, Berl. Ent. Zeitschr., 1898 (1897) XLII Heft 3 and 4 p. 205.—Stein, Ann. Mus. Nat. Hungarici,

1904 II p. 466.—Aldrich, Misc. Coll. Smiths. Inst., 1905 XLVI No. 1444 p. 546.—Smith, Ann. Report N. J. State Museum, 1909, 1910 p. 790.—Malloch, Trans. Amer. Ent. Soc., 1918 XLIV No. 782 p. 275.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 133.—Stein, Arch. f. Naturgesch., 1920 (1918) Abt. A Heft 9 p. 56.—Cole and Lovett, Proc. Cal. Acad. Sci., 1921 XI No. 15 p. 311.

Lispoides æquifrons Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 147.—Johnson, Occ. Papers Boston Soc. Nat. Hist., No. VII, 1925 p. 228.—Huckett, Mem. 101, N. Y. (Cornell) Agric. Exp. Station, 1928 (1926) p. 834.

Lispoides æqualis Malloch, Canad. Ent., 1921 LIII p. 61.—Cridle, 58th Ann. Rept. Ent. Soc. Ont., 1927, 1928 p. 100.

RECORDS:—

Alberta, 1 ♂, High River, Sept. 27, 1927. (O. Bryant)

Washington, 1 ♂, 2 ♀, Coulee City, Sept. 3, 1920; 1 ♂, Stratford, Sept. 4, 1920. (R. C. Shannon) 1 ♀, Wawawai, May 28, 1922; 1 ♀, Entiat, July 26, 1919; 1 ♀, Spokane, Aug. 8, 1919; 1 ♀, Lilliwaup, Aug. 12, 1921. (A. L. Melander)

Oregon, 1 ♀, Hood Rapids, Mt. Hood, July 29, 1921. (A. L. Melander)

California, 1 ♂, San Diego, June 28, 1917 (J. M. Aldrich)

Idaho, 2 ♂, Lewiston, June 1, 1919; 1 ♂, Moscow Mt., May 14, 1921. (A. L. Melander)

Colorado, 1 ♀, Tenn. Pass, July 23, 1917. (J. M. Aldrich)

Arizona, 1 ♂, Pinnaleno Mts., Ft. Grant, July 18, 1917. (R. C. Shannon)

Indiana, 1 ♂, Lafayette, Sept. 23, 1917; 1 ♀, Nov. 5, 1913. (J. M. Aldrich)

New York, 1 ♀, Ithaca, June. (R. C. Shannon); 1 ♀, Coy Glen, Ithaca, June 12, 1920. (M. D. Leonard); 2 ♂, Coy Glen, Ithaca, Aug. 1, 1920; 3 ♂, 2 ♀, Sept. 19, 1920; 2 ♂, 1 ♀, Butternut Creek, Ithaca, Sept. 25, 1920; 2 ♀, Buttermilk, Ithaca, July 10, 1920; 1 ♀, Ithaca, 19—; 2 ♂, 1 ♀, Aurora, May 30, 1920; 1 ♀, Harmon, July 5, 1926; 1 ♂, 1 ♀, Valley Stream, Long Island, April 27, 1921; 1 ♂, Cold Spring Harbor, Long Island, July 26, 1921.

Quebec, 1 ♀, St. Chrysostome, June 28, 1917. (G. S. Walley)

The species is undoubtedly present in nearly all parts of North America. It is commonly to be found on the rocks of rivers and streams. The head of the male and female are very similar in structure and vestiture, the eyes being separated by a distance slightly less than that between the oral vibrissæ. In addition, the species may be readily separated from those which possess widely separated eyes in the male by the presence of setulose hairs on the dorsal half of parafacials.

Subgenus *Gymnodia* Robineau-Desvoidy

Gymnodia Robineau-Desvoidy, Hist. Natur. d. Dipt., 1863 II p. 635.—Pandellé, Revue ent. France, 1898 XVII pp. 22, 45.—Stein, Katalog Paläark. Dipt., 1907 III p. 747.—Collin, Ent. Month. Mag., 1921 3rd ser. VII pp. 96, 99.—Séguy, Faune de France, Part VI, 1923 pp. 196, 217.—Karl, Die Tierwelt Deutschlands, T. 13, 1928 pp. 93, 104.—Malloch, Entom. Mitteil., 1928 Band XVII Nr. 4 pp. 290, 296.

Brontaea Kowarz, Verh. zool.-bot. Ges. Wien, 1873 XXIII p. 461. Schnabl and Dziedzicki, Abh. d. Kaiserl. Leop.-Carol. Deutsch. Akad. d. Naturforsch., 1911 Band XCV Nr. 2 p. 149.

Spilogaster in part, Meade, Ent. Month. Mag., 1881 XVIII p. 102.—Meade, Deser. List Brit. Anth., 1897 I p. 23.

Limnophora in part, Williston, Trans. Ent. Soc. Lond., 1896 Part III p. 369.—Pandellé, Revue ent. France, 1899 XVIII, p. 130.—Stein, Katalog Paläark. Dipt., 1907 III pp. 669, 673.—Coquillett, Proc. U. S. Nat. Mus., 1910 XXXVII No. 1719 p. 548.—Stein, Arch. f. Naturgesch., 1914 (1913) Abt. A Heft 8 pp. 28, 29.—Stein, Arch. f. Naturgesch., 1916 (1915) Abt. A Heft 10 pp. 83, 109.—Ringdahl, Ent. Tidskr., 1918 XXXIX Heft 2 p. 159.

Eulimnophora Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 145.—Malloch, Canad. Ent., 1921 LIII p. 12.—Malloch, Ann. Mag. Nat. Hist., ser 9 1921 VII p. 165.

In 1863 Robineau-Desvoidy described the genus *Gymnodia* for the reception of the single species *pratensis*, new, which has been regarded by subsequent authors as the type of the genus. It was early accepted that *Gymnodia pratensis* was a synonym of *Anthomyia polystigma* Meigen, a species listed by Macquart (23)

in 1835 as belonging to the genus *Limnophora sens.-lat.* On account of the distal curvature of the wing vein *M.* 1+2 in the type, the genus *Gymnodia* was associated by both Robineau-Desvoidy and Pandellé (41) (37) with such muscoid genera as *Graphomyia*, *Muscina*, and *Stomoxys*. Stein (56) in his catalog of palaearctic diptera recorded the genus as interpreted by Pandellé among the "*genera dubia*," although earlier in the same work he had listed Robineau-Desvoidy's genus among the synonyms of *Limnophora*.

In later years, Collin (5), followed by Séguéy (51) and Karl (19), has redefined the genus, maintaining its association with closely allied groups as subgenera of the genus *Limnophora sens.-lat.*

In 1873 Kowarz (20) erected the genus *Brontæa* with *polystigma* Meigen as type. If the synonymy of *pratensis* with *polystigma* be accepted, then *Brontæa* becomes an absolute synonym of *Gymnodia*.

In 1881 Meade (34) included the species *polystigma* together with other British species of *Limnophora sens.-lat.* in the genus *Spilogaster*.

In 1911 Schnabl and Dziedziński (49) maintained the identity of *Brontæa* as a valid subgenus of *Limnophora*, whilst Stein and other European authors continued to regard the genus of doubtful rank, merging its identity with that of *Limnophora*.

In 1920 Malloch (27) described the North American genus *Eulimnophora*, designating *Limnophora arcuata* Stein as the type. There are apparently no satisfactory reasons for maintaining the separate identity of this genus and *Gymnodia*, the generic characters being almost identical.

There are three species belonging to this segregate that have been recognized as occurring in North America; two of them are known to inhabit filth, resembling the common house fly in this respect. According to Malloch (30) the group is better represented in Africa.

Diagnostic characters:—Wing vein *R.* 4+5 with no setulæ at base; prosternum with no series of hairs along lateral margins; parafrontal setulæ not descending onto parafacials to a level below that of base of third antennal segment; eyes ab-

normally large and expansive, restricting the parafrontals and parafacials to lineal dimensions when viewed in profile; in North American species the anterior intraalar bristle is weakly developed, sometimes absent, never longer than caudal pair of acrostical bristles; and the abdominal marks are arcuate in outline; the hind tibiae have the apical anterodorsal bristle absent.

KEY TO SPECIES

1. Palpi and tibiae largely yellowish; thorax with three or more strongly marked vittae *debilis* Williston
- Palpi and tibiae largely black; thorax with vittae more or less suffused and not sharply defined 2
2. Hind femur with a series of bristles on entire length of anteroventral surface those on proximal half short but distinctive; fifth sternum in male with a dense series of longish fine bristles around the border of caudal emargination *ciliifera* Malloch
- Hind femur with anteroventral bristles confined to distal half of surface the proximal half with an irregular series of setulae; fifth sternum in male with only one or two longish setulae adjacent caudal emargination *arcuata* Stein

Limnophora (*Gymnodia*) *debilis* Williston

Limnophora debilis Williston, Trans. Ent. Soc. London, 1896 III p. 369.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 547.

Eulimnophora dorsovittata Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 146.—Malloch, Canad. Ent., 1921 LIII p. 12.—Frison, Bull. Ill. Nat. Hist. Surv., 1927 XVI Art. 4 p. 199.

RECORDS:—

- 1 ♀, Dallas, Texas, Sept. 17, 1907; 1 ♂, Sept. 18, 1907; 2 ♂, Sept. 19, 1907, bred from cow manure (F. C. Pratt). 1 ♀, Biscayne Bay, Florida (A. T. Slosson).

The species is evidently well represented in the countries adjoining the Gulf of Mexico, being recorded from Jamaica, Porto Rico, and St. Vincent, in addition to the above North American records.

I can find no difference that would justify the separation of *dorsovittata* and *debilis* as distinct species. In the above series there is a considerable degree of variation in the color of the abdomen from grayish to entirely yellow depending, evidently, on

the developmental condition of the adults when captured. In the more teneral specimens the color has a tendency to yellowish.

Limnophora (Gymnodia) arcuata Stein

Limnophora arcuata Stein, Berl. Ent. Zeitschr., 1898 (1897) XLII Heft 3 and 4 p. 201.—Coquillett, Proc. U. S. Nat. Mus., 1900 XXII No. 1198 p. 256.—Howard, Proc. Wash. Acad. Sci., 1900 II p. 582.—Stein, Ann. Mus. Nat. Hungarici, 1904 II p. 469.—Aldrich, Misc. Coll. Smithsn. Inst., 1905 XLVI No. 1444 p. 546.—Smith, Ann. Rept. N. J. State Museum 1909, 1910 p. 791.—Stein, Arch. f. Naturgesch., 1911 Abt. A Heft I p. 135.—Johnson, Bull. Amer. Mus. Nat. Hist., 1913 XXXII Art. 3 p. 76.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 133.—Stein, Arch. f. Naturgesch., 1920 (1918) Abt. A Heft 9 p. 48, 56.

Eulimnophora arcuata Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 145.—Malloch, Canad. Ent., 1921 LIII p. 12.

Spilogona (Gymnodia) arcuata Hockett, Mem. 101 N. Y. (Cornell) Agric. Exp. Station, 1928 (1926) p. 834.

RECORDS:—

1 ♀, Riverhead, New York, August 7, 1925; 1 ♀, August 8, 1927; 1 ♀, De Witt, Mitchell Co., Ga., July 23, 1912 (M. D. Leonard); 1 ♀, Gainesville, Tex., May 15, 1923 (E. E. Russell).

The species is widely distributed throughout North America. Howard (16) includes the species among those flies that are commonly found associated with filth and manure, and hence capable of contaminating human food by their presence.

Limnophora (Gymnodia) cilifera (Malloch)

Eulimnophora cilifera Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 145.—Malloch, Canad. Ent., 1921 LIII p. 12.—Frison, Bull. Ill. Nat. Hist. Surv., 1927 XVI Art. 4 p. 198.

RECORDS:—

1 ♂, Atherton, Missouri, Oct.; 1 ♂, Aug. —; 5 ♂, Columbus, Ohio, April 10 (J. S. Hine).

The species is smaller than either *debilis* or *arcuata*, rarely exceeding four millimeters in length. The females of *cilifera* and

arcuata are not readily distinguished structurally. In the former species the hind femur has a uniform series of short bristly hairs on proximal half of anteroventral surface, which is lacking in *arcuata*.

Subgenus *Spilogona* Schnabl and Dziedziicki

Spilogona Schnabl and Dziedziicki, Abh. d. Kaiserl. Leop.-Carol. Deutsch. Akad. d. Naturforsch., 1911 XCV Nr. 2 pp. 141, 152.—Collin, Ent. Month. Mag., 1921 ser. 3 VII pp. 97, 98, 162.—Séguy, Faune de France, 1923 Pt. VI pp. 196, 205.—Malloch, Psyche, 1924 XXXI No. 5 p. 200.—Karl, Tierwelt Deutschlands, 1928 Th. XIII p. 97.—Collin, Trans. Ent. Soc. London, 1930 LXXVIII Pt. 2 p. 257.

Paralimnophora Malloch, Proc. U. S. Nat. Mus., 1913 XLV No. 2004 p. 603.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 pp. 134, 141.

Limnophora in part, Stein, Arch. f. Naturgesch., 1911 Abt. A Heft 1 pp. 111, 137.—Stein, Arch. f. Naturgesch., 1914 (1913) Abt. A Heft 10 p. 27.—Stein, Arch. f. Naturgesch., 1916 (1915) Abt. A Heft 10 p. 83.—Johannsen, Trans. Amer. Ent. Soc., 1916 XLII No. 756 p. 391.—Ringdahl, Ent. Tidskr., 1918 XXXIX p. 158.—Stein, Arch. f. Naturgesch., 1919 (1917) Abt. A Heft 1 p. 133.—Stein, Arch. f. Naturgesch., 1920 (1918) Abt. A Heft 9 p. 46.—Malloch, Trans. Amer. Ent. Soc., 1920 XLVI No. 802 p. 147.

Melanochelia Malloch not Rondani, Canad. Ent., 1921 LIII p. 61.

In 1911 Schnabl and Dziedziicki (49) proposed the subgenus *Spilogona* as one of seven subgenera comprising the genus *Limnophora sens.-lat.* The new group contained nineteen European species, most of which had been recorded previously in such genera as *Aricia*, *Anthomyia*, *Spilogaster*, and *Limnophora* of authors.

The species belonging to *Spilogona* are separated from those of *Limnophora* according to Schnabl and Dziedziicki on the basis of a number of arbitrary characters which are difficult to evaluate, such as the degree of development of the bristles of the legs, the extent of convergence or divergence of veins *R.* 4 + 5 and *M.* 1 + 2, and the structure of the male genitalia. It remained for later workers to exploit the full significance of such conceptions. Mal-

loch (26) in 1918 had found a new combination of characters for splitting the old genus *Limnophora* into at least two parts, but was hesitant in naming them owing to the apparently uncertain status of many of the European segregates. His conception of the group, except for minor differences, approached that of Schnabl and Dziedzicki, although he misnamed the group *Melanochelia Rondani*, a nomenclatorial error corrected by him later (28) (31). Collin (5) in 1921, working independently, introduced the same characters used by Malloch to realign the component parts of *Limnophora sens.-lat.* According to these characters *Spilogona* belongs to the division of *Limnophora sens.-lat.* having no setulæ at base of vein *R.* 4 + 5, and no series of hairs along the lateral margins of prosternum. He, further, designated the fourth species of the original series, namely, *Anthomyia compuncta* Wiedemann, as the type of *Spilogona*. Séguy (51) in 1923 and Karl (19) in 1928 adopted Collin's classification of *Limnophora*, with but minor differences, in compiling a list of the species occurring in France and Germany respectively. Karl incidentally proposed the species *Musca dispar* Fallen as type of *Spilogona*,* a proposal which I am unable to accept on account of Collin's (5) prior designation of *compuncta*.

Stein (58) and Ringdahl (39) evidently recognized that there was some justification for the recognition of certain of the segregates comprising the genus *Limnophora sens.-lat.*, but there is no evidence that they were aware of the full import of such characters as introduced by Malloch and Collin. Hence the segregate *Spilogona* was not recognized by these authors, no doubt partly owing to the inadequacy of the characters cited by Schnabl and Dziedzicki in defining the group.

Malloch (25) in 1913 proposed the genus *Paralimnophora* for the reception of *narina* Walker (= *brunnesquama* Malloch), basing his genus on the widely separated eyes and abnormally stout vertical and ocellar bristles on the head of the male. Stein (59) in 1919 pointed out that *Paralimnophora* was preoccupied in nomenclature, and placed Malloch's species in *Limnophora*. Malloch (28) in his key to *Melanochelia* (Malloch not *Rondani*)

* See footnote on page 37.

included the same species under the name *velutina* (*brunnesquama* preoc.). I am doubtful whether the genus is entitled to full recognition, and prefer to merge it for the present with *Spilogona*, as already indicated by Malloch himself (28).

The subgenus *Spilogona* contains by far the greatest number of species of any of the groups included in this study. The species are to be found in greatest abundance in the Canadian and subarctic life zones, descending through North America by way of the mountain ranges. In comparison, the species belonging to *Limnophora sens.-str.* and to *Gymnodia* are comparatively numerous in the tropical and subtropical zones whilst those of *Spilogona* are evidently fewer.

In structure *Spilogona* is most closely allied to *Gymnodia*, differing essentially from the latter group in having the frons, parafacials, and cheeks relatively well developed, not constricted to lineal proportions by the abnormal size of the eyes, and, in the North American species, by the markings on the abdomen being subtriangular or trapezoidal in shape, not arcuate.

Diagnostic characters:—Wings with no setulæ at base of vein *R*. 4+5: prosternum with no series of hairs along lateral margins: parafacials at base of antennæ with no setulose hairs descending to a level below that of base of third antennal segment: cheeks well developed, not constricted, usually higher than breadth of parafacials at base of antennæ: abdominal markings, if present, not arcuate in outline, usually trapezoidal, spherical, or subtriangular in outline.

KEY TO SPECIES

Males

1. Postsutural dorsocentral bristles usually four pairs2
- Postsutural dorsocentral bristles usually three pairs54
2. Inner pair of vertical bristles and cephalic pair of ocellar bristles robust, equal in size to first pair of dorsocentral bristles; eyes separated by a distance equal to length of antenna; calyptræ blackish brown*narina* Walker
- Inner pair of vertical bristles and cephalic pair of ocellar bristles slender, shorter than length of first pair of dorsocentral bristles; or, one or other pair of bristles may be as robust, but not both; eyes separated by a distance less than length of antenna, or, if as great, the calyptræ are whitish3
3. Mid tibia with one or more median ventral bristles4

- Mid tibia with no median ventral bristles 9
- 4. Oral margin when viewed in profile, protruded slightly beyond a level with base of antenna 5
- Oral margin, when viewed in profile, not protruded beyond a level with base of antenna 6
- 5. Scutellum with no appressed setulæ on dorsal margin of lateral declivities adjacent the apical bristles; halteres yellowish to brownish; fore tibia with no median posterior bristle; sternopleural bristles, 1: 1. *subrostrata* Stein
- Scutellum with appressed setulæ on dorsal margin of lateral declivities adjacent the apical bristles; halteres black; fore tibia with a median posterior bristle; sternopleural bristles, 1: 2 *hyperborea* Boheman
- 6. Halteres tinged with black; abdomen entirely blackish opaque 7
- Halteres deep yellow; abdomen with more or less grayish pruinescence on terga, subshining 8
- 7. Hind femur with a series of short bristles on basal half of posteroventral surface; parafrontals with a pair of short bristles situated nearly on a level with anterior ocellus; frontal triangle opaque, not highly polished *obsoleta* Malloch
- Hind femur with no bristles on proximal half of posteroventral surface; parafrontals with no pair of weak bristles situated nearly on a level with anterior ocellus; frontal triangle glossy and polished. *melanosoma*, n. sp.
- 8. Hind femur with a proximal series of longish posteroventral bristles; with the anteroventral series of bristles continued to base of femur; notopleural callosity with setulæ *novæ-angliæ* Malloch
- Hind femur with no series of longish bristles on proximal half of posteroventral surface; with the anteroventral series of bristles confined to distal half of femur; notopleural callosity with no setulæ. *sectata*, n. sp.
- 9. Mid femur with a single stout spinelike bristle at base of ventral surface 10
- Mid femur without stout spinelike bristle at base of ventral surface, with or without the usual series of two or more posteroventral bristles 13
- 10. Processes of fifth sternum glossy at apex, highly polished; halteres blackish; mesonotum bluish gray, with trace of brownish median vitta caudad of transverse suture *monacantha* Collin
- Processes of fifth sternum not glossy nor highly polished at apex; halteres yellowish to brownish; mesonotum blackish or cinereous 11
- 11. Parafacials at base of antennæ narrower than breadth of third antennal segment; mesonotum largely blackened, at most with trace of vittæ on presutural area; eyes separated by a distance not greater than that between posterior ocelli; costal thorn small 12
- Parafacials at base of antennæ as broad as breadth of third antennal

- segment; mesonotum grayish pruinosecent, with seal brown infuscation, with 3 to 5 brownish vittæ on postsutural area; eyes separated by a distance at least as great as that between posterior ocelli; costal thorn robust *sospita*, n. sp.
12. Parafrontals contiguous caudad, interrupting the frontal vitta; mid tibia with no anterodorsal bristles; abdominal marks on terga 3 and 4 expansive, extending to ventral surface..... *instans*, n. sp.
- Parafrontals separated caudad by a lineal frontal vitta; mid tibia with 1 or 2 short anterodorsal bristles; abdominal markings on terga 3 and 4 confined to dorsum..... *semiglobosa* Ringdahl
13. Halteres normally blackish 14
- Halteres normally yellowish 34
14. Processes of fifth sternum clothed with a dense mat of fine spinules along inner border *setilamellata*, n. sp.
- Processes of fifth sternum with sparsely set setulæ or fine bristles on inner border 15
15. Oral margin protruded beyond a level with base of antenna..... 16
- Oral margin not protruded beyond a level with base of antenna..... 20
16. Large grayish species, 8 mm.; head buccate (as in *Hammomyia*) with parafacials broader than length of third antennal segment.
- tendipes* Malloch
- Species not exceeding 7 mm. in length; parafacials not as broad as length of third antennal segment; eyes separated by a distance less than length of third antennal segment 17
17. Scutellum with setulose, appressed hairs on dorsal margin of lateral declivities adjacent the apical bristles; mesopleural series of bristles with an intermediate predorsal bristle; abdomen brownish black, shining, with no markings; parafacials at base of antennæ narrower than breadth of third antennal segment..... *almquistii* Holmgren
- Scutellum with no setulose hairs on dorsal margin of lateral declivities adjacent the apical bristles; mesopleural series of bristles with no intermediate predorsal bristle; abdomen with distinct grayish pruinosecence and blackish marks; parafacials at base of antennæ as broad as width of third antennal segment..... 18
18. Mesonotum with pale grayish pruinosecence, and with five well marked black vittæ, the laterals foreshortened; cerci elongate, produced as a narrow polished, chitinous lamella..... *sanctipauli* Malloch
- Mesonotum largely blackish, with at most a trace of vittæ on presutural area; cerci not elongated, the apex extended as two slender, short styli 18a
- 18a. Scutellum and presutural area of mesonotum sparsely setulose, the presutural acrosticals in two distinct series; mesopleura with pale grayish pruinosecence *megastoma* Boheman
- Scutellum and presutural area of mesonotum densely setulose, the presutural acrosticals indistinguishable from the adjacent setulæ; mesopleura entirely blackened 19

19. Eyes with a few hairs; mid tibia with no anterodorsal bristle.
tristiola Zetterstedt
 — Eyes bare; mid tibia with 1 or 2 anterodorsal bristles.
extensa Malloch
20. Presutural acrosticals stouter developed than the adjacent setulæ; fore tibia with a strong apical posteroventral bristle; hind tibia with the distal bristle of anterodorsal series stouter developed than the proximal bristle; abdomen with widely separated dorsal markings, between which there are traces of a dorsocentral vitta.....21
- Presutural acrosticals setulose; fore tibia with a weak apical posteroventral bristle; hind tibia with anterodorsal bristles not noticeably unevenly developed, or the distal bristle of series weaker developed than the proximal bristle; abdomen with markings fused or narrowly separated, and with no apparent dorsocentral vitta.....22
21. Eyes separated by a distance less than that between posterior ocelli inclusive; parafrontals contiguous cephalad of anterior ocellus; abdomen stoutly developed, short; abdominal markings sharply defined, broadly subtriangular; calyptre white.....*fatima*, n. sp.
- Eyes separated by a distance exceeding that between posterior ocelli; parafrontals noticeably, though narrowly, separated cephalad of anterior ocellus; abdomen conical; abdominal markings ill defined, narrowly subtriangular; calyptre yellowish tinged.
tetrachata Malloch
22. Scutellum with a few setulose hairs on dorsal margin of lateral declivities adjacent apical bristles23
- Scutellum with no such hairs on dorsal margin of lateral declivities adjacent apical bristles29
23. Calyptre entirely blackish brown, concolorous with halteres; abdomen entirely blackish, with no markings on terga.....*concolor* Stein
- Calyptre whitish in contrast to color of halteres; abdomen with markings on terga24
24. Terga 3, 4, and 5 densely whitish pruinose, with a pair of subquadrate marks on tergum 3 only; eyes sparsely haired; halteres fuscous.
leucogaster Zetterstedt
- Terga 3, 4, and 5 with grayish pruinescence, and with markings on tergum 4 as well as on tergum 325
25. Hind femur with a series of longish weak bristles on proximal half of posteroventral surface, the anteroventral series of bristles continued to base of femur*obscuripennis* Stein
- Hind femur with no series of bristles on proximal half of posteroventral surface, at most with 1 or 2 isolated bristles; anteroventral series of bristles confined to distal half of femur.....26
26. Mesopleural series of bristles with one or more weaker intermediate predorsal bristles27
- Mesopleural series of bristles with no such predorsal bristles.....28

27. Abdomen broadly ovate, depressed; hind tibia with one robust anterodorsal bristle situated at middle of tibia; basal sclerite of hypopygium with bristles scattered in a transverse series.....*pusilla*, n. sp.
- Abdomen cylindrical or conical, not flattened dorsoventrally; hind tibia with 2 or 3 anterodorsal bristles; basal sclerite of hypopygium restricted, the bristles appearing tufted.....*denudata* Holmgren
28. Abdomen with markings on tergum 3 distinctly though narrowly separated, those on tergum 4 reduced in area, the surface largely densely whitish gray pruinulent; halteres black.....*addicta*, n. sp.
- Abdomen with markings on tergum 3 fused across the dorsum, or, obscurely divided at middle, those on tergum 4 well developed, the tergal surface subshining, with dark reflections; halteres brownish.
area Zetterstedt
29. Hind femur with no series of bristles on proximal half of posteroventral surface; sternopleura clothed on ventral surface with a tuft of abnormally stiff bristles*pulvicrura*, n. sp.
- Hind femur with a series of two or more bristles on proximal half of posteroventral surface30
30. Wings densely infuscated, blackened basad; abdominal markings on terga 3 and 4 confined to dorsum, their length longer than their greatest width*carbonella* Zetterstedt
- Wings hyaline or at most with traces of infuscation; abdominal markings on terga 3 and 4 broadly expanding caudad to reach the ventral surface, their length shorter than their greatest width.....31
31. Eyes widely separated, frontal vitta as broad immediately cephalad of anterior ocellus as at base of antennæ; vibrissal area clothed with numerous, short coarse setulæ; ocellar triangle pollinose; hind tibia with apical anterodorsal bristle well developed, equivalent in length to apical anteroventral bristle*nobilis* Stein
- Eyes separated narrowly, frontal vitta not as broad immediately cephalad of anterior ocellus as at base of antennæ; vibrissal angle clothed with numerous fine, longish setulæ; frontal triangle highly polished; hind tibia with apical anterodorsal bristle setulose.....32
32. Eyes with numerous hairs; parafrontal bristles continued in series caudad to a level with anterior ocellus; buccæ with dense, fine, upcurved setulæ; mesonotum largely deep blackish; calyptæ and wings clear, hyaline*alberta*, n. sp.
- Eyes bare, or at most with hairs very sparse; parafrontal bristles not continued in series to a level with anterior ocellus; buccæ almost devoid of setulæ, the latter confined in a marginal series ventrad; mesonotum largely grayish33
33. Eyes separated by a distance less than that between posterior ocelli; cheek, ventrad of eye, at greatest height exceeding length of third antennal segment, abruptly constricted throughout the caudal area by the curvature of the occipital margin; thoracic vittæ abruptly termi-

- nated at transverse suture, the presutural area with no brownish vittæ *crepusculenta*, n. sp.
- Eyes separated by a distance greater than that between posterior ocelli; cheek ventrad of eye, at greatest height scarcely as high as length of third antennal segment, the curvature of the occipital margin more obtuse, resulting in a less marked constriction of the caudal area of cheek; thorax with vittæ continued from postsutural to presutural area *comata*, n. sp.
34. Scutellum with two or more setulose, appressed hairs on dorsal margin of declivities adjacent the apical bristles 35
- Scutellum with no such setulose hairs on dorsal margin of declivities adjacent the apical bristles 38
35. Mesopleural series of bristles with one or more weaker intermediate predorsal bristles; markings on tergum 3 large, often fused mesad, extending along the caudal margin of tergum to lateral border of dorsum *area* Zetterstedt
- Mesopleural series of bristles with no intermediate predorsal bristles, the intermission bare; markings of tergum 3 rarely fused mesad 36
36. Hind femur with the distal bristle of anterodorsal series situated at a lower (ventral) plane to those of the series; wings largely infuscated; cross veins clouded; basal sclerite of hypopygium shining. *nigriventris* Zetterstedt
- Hind femur with the distal bristle of anterodorsal series situated in a continuous series with the remainder, not in a decidedly lower (ventral) position; wings largely hyaline, slightly infuscated basad; cross veins clear; basal sclerite of hypopygium grayish pollinose 37
37. Presutural area of thorax with only a median vitta, the postsutural area with three vittæ, the sublaterals not extending cephalad beyond the transverse suture; scutellum entirely infuscated, not concolorous with mesonotum; proboscis with distal section noticeably shortened. *arenosa* Ringdahl
- Presutural area of thorax with three vittæ, median and sublaterals, the latter not foreshortened at transverse suture; scutellum concolorous with mesonotum; proboscis with distal section not abnormal in length *denu data* Holmgren
38. Hind femur with one or more longish bristles on proximal half of posteroventral surface, exceeding in length the apical setæ 39
- Hind femur with a series of normal setulæ on proximal half of posteroventral surface, none of which are longer than the apical setæ 48
39. Processes of fifth sternum of abdomen sharply attenuated at apex; eyes large, when viewed in profile the ventral margin reaching to a level with oral vibrissæ, thereby restricting the cheeks to narrow proportions 40
- Processes of fifth sternum broad and rounded in outline toward apex, not attenuated sharply; cheeks broad, higher than breadth of para-

- facials at base of antennæ; ventral margin of eyes not reaching a level with oral vibrissæ41
40. Abdomen silvery white pruinulent, with two small blackish marks on tergum 3 only*argentiventris* Malloch
- Abdomen grayish pruinulent, with small, paired, deep brownish spots on terga 3 and 4, the marks on tergum 4 more or less obscure.
argentiventris var. *occidentalis*, n. var.
41. Abdomen cinereous gray with two relatively small marks on terga 3 and 4; presutural acrosticals bristlelike but short; vibrissal area clothed with numerous short, stout setulæ.....*cretans*, n. sp.
- Abdomen with tergal markings relatively large or conspicuous; presutural acrosticals setulose; vibrissal area clothed with fine setulæ.....42
42. Scutellum, basal segment of hypopygium and terga 1+2 largely grayish pollinose; wings hyaline43
- Scutellum, basal segment of hypopygium and terga 1+2 largely blackish, subshining; wings infuscated at base44
43. Mid and hind femora with a series of bristles on proximal half of posteroventral surface; eyes widely separated, distance greater than that between posterior ocelli inclusive, parafrontals not contiguous; tibiæ and tarsi usually yellowish*rufitarsis* Stein
- Mid and hind femora with no series of bristles on posteroventral surface, at most with a few longish setulæ at base of femur; eyes separated by a distance less than that between posterior ocelli inclusive, parafrontals contiguous; tibiæ and tarsi usually blackish.
placida, n. sp.
44. Subcosta with a few setulæ on under surface proximad of humeral cross vein; hind tibia with 4 or 5 anteroventral bristles; humeral and notopleural callosities strikingly pale grayish pruinulent.
setinervis, n. sp.
- Subcosta bare on under surface proximad of humeral cross vein; hind tibia with 2 or 3 anteroventral bristles,45
45. Hind femur with bristles on proximal half of posteroventral surface shorter than those on proximal half of posterior surface, not longer than breadth of femur; abdomen narrowly conical, third and fourth sterna longer than broad, clothed with short vestiture.
carbonella Zetterstedt
- Hind femur with bristles on proximal half of posteroventral surface longer than those on proximal half of posterior surface, the longest longer than breadth of femur; abdomen broadly conical, subovoid; third and fourth sterna broader than long, clothed with longish vestiture46
46. Processes of fifth abdominal sternum with a highly polished apical process on inner margin; mid tibia with 1 or 2 well developed antero-dorsal bristles, with no median posteroventral bristle.

compuncta Wiedemann

- Processes of fifth sternum rounded at apex, with no highly polished attenuation on inner margin; mid tibia with anterodorsal bristles at most setulose, frequently absent.....47
- 47. Proboscis polished; fore tibia with no median posterior bristle; first abdominal sternum bare*novæ-angliæ* Malloch
- Proboscis lightly pollinose; fore tibia with a median posterior bristle; first abdominal sternum with a few setulæ.....*alliterata*, n. sp.
- 48. Mesopleural series of bristles with one or more weaker intermediate predorsal bristles49
- Mesopleural series of bristles with no predorsal bristle, the interspace bare50
- 49. Thorax with three distinctive broad bandlike vittæ; eyes with numerous hairs; calyptræ intensively yellow; scutellum with a noticeably paler area on discal surface*trilineata*, n. sp.
- Thorax with no distinctive broad vittæ; eyes bare; calyptræ slightly tinged; scutellum entirely black*imitatrix* Malloch
- 50. Abdomen with a narrow brownish interrupted dorsocentral vitta; inner margins of markings on terga 3 and 4 divergent cephalad, the markings broadly separated; terga 1+2 grayish pruinose with brownish reflections, not blackened; calyptræ intensively yellowish; frontal vitta entire, distinctly separating the parafrontals; wings clear at base*incauta*, n. sp.
- Abdomen with no dorsocentral vitta; inner margin of markings on tergum 3 subparallel; terga 1+2 largely blackish or brownish, colorous with abdominal marks51
- 51. Thorax largely pale, grayish, with a broad, quadrate, light brownish spot between the dorsocentral bristles immediately caudad of transverse suture; scutellum infuscated on basal half; presutural acrosticals stoutly developed, bristlelike but short; fifth tergum pale, grayish, unmarked*brevicornis* Malloch
- Thorax largely blackish or deep brownish; markings obscured; presutural acrosticals setulose; fifth tergum with marks52
- 52. Parafrontals with a continuous series of uniformly developed bristles to about level with anterior ocellus; processes of fifth sternum more or less reddish tinged along the inner margin; wings blackened basad.*fuscomarginata*, n. sp.
- Parafrontal bristles not continued in series to about level with anterior ocellus, the anterior pairs of bristles in series noticeably stouter developed than those situated caudad; processes of fifth sternum not reddish tinged along inner margin; wings at most brownish infuscated at base, not blackened53
- 53. Parafrontals and parafacials in profile almost obliterated from view; basal segment of hypopygium grayish pollinose; processes of fifth sternum not attenuated at apex; proboscis lightly pollinose.*torreyæ* Johannsen
- Parafrontals and parafacials readily recognized when viewed in profile, at broadest distance equal to half breadth of third antennal seg-

ment; basal segment of hypopygium blackish, shining; processes of fifth sternum attenuated at apex; proboscis glossy, polished.

crassiventris, n. sp.

54. Head with inner pair of vertical bristles stoutly developed, equal in size to the first pair of parafrontal bristles55
- Head with inner pair of vertical bristles fine and slender, not equal in development to first pair of parafrontal bristles60
55. Hind femur with a series of longish bristles on posteroventral surface; grayish brown species56
- Hind femur at most with a series of setulæ on posteroventral surface; grayish white species57
56. Ocellar bristles as long and as robust as first pair of dorsocentral bristles; eyes separated by a distance greater than half that between first pair of dorsocentral bristles; mid femur with bristles on basal third of posteroventral surface fine and setulose.....*acuticornis* Malloch
- Ocellar bristles shorter and weaker developed than first pair of dorsocentral bristles; eyes separated by a distance about equal to half that between first pair of dorsocentral bristles; mid femur with at least 2 or 3 bristles on basal third of posteroventral surface strong and bristlelike.....*surda* Zetterstedt
57. Eyes separated at middle of frons by a distance fully equal to length of third antennal segment; thorax with three intensive, brown vittæ; scutellum with brownish marks laterad58
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58. Cheek ventrad of eye not higher than breadth of third antennal segment; frontal vitta black, opaque; fore tibia with a posterior bristle at middle*caroli* Malloch
- Cheek ventrad of eye higher than breadth of third antennal segment; frontal vitta whitish pruinose; fore tibia with no posterior bristle at middle*argenteiceps* Malloch
59. Third antennal segment three times as long as wide, reaching to a level below that of ventral margin of eye; parafrontals at base of antennæ noticeably prominent, protruding beyond a level with the base of vibrissæ*clarans*, n. sp.
- Third antennal segment not more than twice as long as wide, not reaching to level of ventral margin of eye; parafrontals not prominent nor protruding, not broader than width of third antennal segment.
cana, n. sp.
60. Mid femur with two stout erect bristles at base of posteroventral surface, in addition to the bristle at base of ventral surface61
- Mid femur with a series of four or more bristles on proximal half of posteroventral surface, if less the bristles are not spinelike62
61. Blackish species; scutellum and basal segment of hypopygium shining, black; wings intensively infuscated*bisetosa*, n. sp.

- Grayish species; scutellum grayish tinged, basal segment of hypopygium largely grayish pollinose; wings tinged, notably adjoining the veins *bisetosa* var. *pruinella*, n. var.
- 62. Hind tibiæ, at least, yellowish, occasionally infuscated63
- Hind tibiæ blackish64
- 63. Scutellum with a few fine appressed setulæ on dorsal margin of lateral declivities adjoining apical bristles; parafrontal bristles not continued in series caudad to about level with anterior ocellus; processes of fifth sternum truncate at apex; abdominal markings not well defined *rufitibia* Stein
- Scutellum with no appressed setulæ on upper margin of lateral declivities adjacent the apical bristles; parafrontal bristles continued in series caudad to a level approximating that of anterior ocellus; processes of fifth sternum not truncate at apex; abdominal markings sharply defined *suspecta* Malloch
- 64. Hind femur with a series of bristles situated on proximal two-thirds of posteroventral surface, the longest of which exceeds in length that of apical setæ on posteroventral surface65
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surda Zetterstedt
- Eyes separated at narrowest by a distance less than half that between first pair of dorsocentral bristles; parafacials at base of antennæ not as wide as length of second antennal segment66
- 66. Hind femur with bristles on proximal half of anteroventral surface fully as long as those on distal half *fimbriata*, n. sp.
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- 67. Third abdominal tergum with large black trapezoidal markings whose proportions largely constrict the lighter pollinose areas to insignificance, frequently the entire tergum together with terga 1+2 almost entirely blackened; supraalar bristle with no short duplicating bristle immediately caudad; costal vein with a series of prominent though not long setulæ on proximal half; scutellum with 2 or 3 appressed setulæ on dorsal margin of lateral declivities adjacent the apical bristles *pluvialis*, n. sp.
- Tergum 3 with markings longer than average breadth, confined to mesal third of tergum, the tergal surface largely grayish white pruinose; supraalar bristle with a weak but distinctive duplicating bristle immediately caudad; costal vein with setulæ not readily distinguished from the surrounding vestiture68

68. Scutellum with two fine appressed setulæ on dorsal margin of lateral declivities adjacent apical bristles; hind femur with a series of long fine bristles on proximal half of posteroventral surface, the longest exceeding in length the width of femur where situated; hind tibia with apical anterodorsal bristle weakly developed. *baltica* Ringdahl
- Scutellum with no fine appressed setulæ on dorsal margin of lateral declivities adjacent apical bristles; hind femur with a series of short bristles on proximal half of posteroventral surface, the longest of which are not longer than breadth of femur where situated; apical anterodorsal bristle of hind tibia well developed69
69. Halteres blackish; mesopleural series of bristles with a weaker intermediate predorsal bristle; arista pubescent, hairs longer than basal diameter of arista*carbonella* Zetterstedt
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71. Wings tinged with infuscation; thorax and coxæ brownish black, face brownish pollinose; fifth sternum deeply incised, the incision reaching to middle of plate*contractifrons* var. *fumipennis* Zetterstedt
- Wings hyaline throughout; thorax and coxæ lightly grayish white pollinose; face grayish pollinose; fifth sternum shallowly incised, the incision reaching to one-third length of plate*alticola* Malloch
72. Processes of fifth sternum clothed with coarse long black bristles on distal region; mid femur with one basal bristle and a series of 5 or 6 short weak setulose posteroventral bristles on proximal half, the latter not longer than half breadth of femur where situated; eyes separated by a distance greater than breadth of third antennal segment. *pulchra*, n. sp.
- Processes of fifth sternum not clothed with long black bristles on distal half, at most with a few sparsely set bristles; mid femur with a series of 3 or 4 bristles, the longest of which are at least about equal to breadth of femur where situated; eyes separated at narrowest by a distance not greater than breadth of third antennal segment73
73. Abdomen with expansive black subtriangular markings on terga 3 and 4, whose average breadth is greater than length of tergum; basal sclerite of hypopygium black and shining; fifth sternum subshining; wings blackened basad74

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- 74. Calyptræ brownish black*anthrax* Bigot
- Calyptræ whitish, tinged with yellow*magnipunctata* Malloch
- 75. Scutellum with a few appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; sternopleural bristles 1: 1.
reflecta, n. sp.
- Scutellum with no appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; sternopleural bristles, 1: 2.
parvimaclata Stein

Females

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- Mid tibia with no median ventral bristle8
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- 4. Mesopleural series of bristles with one or more weaker intermediate predorsal bristles; fore tarsus with segments 3 and 4 broadened, similar to segment 5 and dissimilar to segment 1; lower calyptra not restricted in size; costa with no series of prominent setulæ on proximal half*novæ-angliæ* Malloch
- Mesopleural series of bristles with no weaker predorsal bristles, the intermission bare; fore tarsus with segments 2 and 3 not broadened, similar to segment 1 and dissimilar to segment 5; lower calyptra narrower at base than greatest length, restricted in size; costa with a series of prominent setulæ on proximal half*obsoleta* Malloch
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hyperborea Boheman
- Scutellum with no setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; mesopleural series of bristles with no pre-apical bristle, the intermission bare; sternopleural bristles, 1: 1.
subrostrata Stein

7. Costa with a few strong accessory setulæ on dorsal surface adjacent the vein *R*. 1 (wing viewed in a horizontal position); lower calyptra reduced in size, very little larger than upper calyptra; scutellum with appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; proboscis lightly pollinose *melanosoma*, n. sp.
- Costa with no accessory setulæ on dorsal surface adjacent vein *R*. 1 (wing viewed in a horizontal position); lower calyptra of normal appearance, larger than upper calyptra; scutellum with no appressed hairs on dorsal margin of lateral declivities adjacent apical bristles; proboscis polished *sectata*, n. sp.
8. Frontal vitta with frontal triangle polished and glossy 9
- Frontal vitta with frontal triangle pruinose, opaque 11
9. Wings conspicuously clouded at cross veins; hind femur with the distal bristle of anterodorsal series situated at a lower (ventrad) plane to those of the series; eyes separated at middle of frons by a distance about equal to greatest breadth of eye when viewed from in front; thorax cinereous gray; abdomen entirely glossy and polished; proboscis lightly pollinose *nigriventris* Zetterstedt
- Wings with cross veins clear; hind femur with the distal bristle of anterodorsal series in the same plane as those of series; eyes separated at middle of frons by a distance greater than maximum breadth of eye when viewed from in front; thorax grayish black; proboscis highly polished 10
10. Halteres blackish; abdomen blackish, shining, unmarked, with trace of brownish pruinescence *concolor* Stein
- Halteres, yellowish, sometimes reddish brown; abdomen lightly grayish pruinose, subshining, with traces of brownish markings.
aerea Zetterstedt
11. Hind femur with bristles or bristly hairs on basal half of posteroventral surface longer than apical setæ on posteroventral surface 12
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12. Presutural acrostical bristles stoutly developed, bristle-like, stronger developed than scutellar setulæ; median series of fine bristly hairs on proximal half of posterior surface of hind femur reduced to 2 or 3 in number 13
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13. Mid tibia with one or two longish anterodorsal bristles; mid femur with a short series of bristles on proximal half of anteroventral surface, the longest of which are equal to those on anterior surface 14
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14. Blackish species, subshining; with slight grayish brown pruinescence; mesonotum with vittæ faint and obscure; abdomen with tergal markings small and indefinite; cheeks about as broad as parafacials at base of antennæ *tetrachæta* Malloch
- Pale, grayish species, opaque; with dense whitish gray pruinescence; mesonotum with three distinct brown vittæ; abdomen with large, brownish tergal markings and dorsocentral vitta; cheeks broader than parafacials at base of antennæ *fatima*, n. sp.
15. Eye nearly as high as length of fore tibia; cheeks about as broad as breadth of third antennal segment; fore tibia with no median posterior bristle *argentiventris* var. *occidentalis*, n. var.
- Eye much shorter in height than length of fore tibia; cheeks much higher than breadth of third antennal segment; fore tibia with a median posterior bristle *cretans*, n. sp.
16. Head, thorax and abdomen densely yellowish gray pollinose, the latter ochreous; thorax and abdomen with no marks *narina* Walker
- Thorax and abdomen at least with markings, or, blackish, shining 17
17. Scutellum with setulose hairs on dorsal margin of lateral declivities adjacent apical bristles 18
- Scutellum with no setulose hairs on dorsal margin of lateral declivities adjacent apical bristles 19
18. Oral margin protruded slightly beyond a level with base of antennæ when viewed in profile; antennæ separated at base by a large facial prominence; proboscis polished; large species, 6-7 mm.
..... *almquistii* Holmgren
- Oral margin not protruded beyond a level with base of antennæ when viewed in profile; antennæ separated at base by a narrow, inconspicuous facial elevation; proboscis pollinose *obscuripennis* Stein
19. Halteres blackish or brownish 20
- Halteres yellow, at most with traces of reddish; if reddish, the ovipositor is armed with stout spinules on anal plates, c. f. *comata* 25
20. Oral margin protruded slightly beyond a level with base of antennæ, when viewed in profile 21
- Oral margin not protruded beyond a level with base of antennæ, when viewed in profile 23
21. Mesonotum grayish pruinose, with five well marked vittæ, which are situated along the planes of the macrochætæ; the laterals are fore-shortened at transverse suture; parafrontals grayish pruinose, with brownish infuscation adjoining the frontal vitta; mid tibia with two anterodorsal bristles *sanctipauli* Malloch
- Mesonotum largely infuscated, with trace of darker streaks between the planes of the macrochætæ; parafrontals entirely brownish infuscated; mid tibia with at most one short anterodorsal bristle 21a
- 21a. Scutellum and presutural area of mesonotum sparsely setulose, the presutural acrosticals distinctly developed; scutellum with a pale grayish dorsocentral streak, and with two blackish areas laterad.
..... *megastoma* Boheman

- Scutellum and presutural area of mesonotum densely setulose, the presutural acrosticals not readily distinguished; scutellum entirely blackish infuscated22
- 22. Eyes with a few hairs; abdomen grayish pruinulent, with black markings*tristiola* Zetterstedt
- Eyes bare; abdomen with no marks*extensa* Malloch
- 23. Mesopleura and scutellum largely blackened; mesonotum with no trace of vittæ; parafrontals entirely brownish infuscated.....*alberta*, n. sp.
- Mesopleura and scutellum largely grayish pruinulent; mesonotum largely grayish with brownish vittæ; parafrontals grayish pruinulent24
- 24. Ovipositor with spinules on anal plates; frontal vitta wider than distance between oral vibrissæ, about three times as wide as each parafrontal*nobilis* Stein
- Ovipositor with fine setulæ on suranal plates; frontal vitta narrower than distance between oral vibrissæ, about equal to twice breadth of each parafrontal*setilamellata*, n. sp.
- 25. Subcostal vein with a few setulose hairs on under surface proximad of humeral cross vein; terga 3, 4, and 5 with paired brownish marks on lateral (ventral) areas, separated from the normal dorsal markings; parafacials at base of antennæ equal to half diameter of eye immediately caudad of this position*setinervis*, n. sp.
- Subcostal vein with no setulose hairs on under surface proximad of humeral cross vein; terga 3, 4, and 5 with no lateral marks other than those that are continuous with those on dorsum; parafacials at base of antennæ less than half diameter of eye immediately caudad of this position26
- 26. Ovipositor armed with spinules on anal plates; calyptræ white27
- Ovipositor clothed with fine setulæ on anal plates; calyptræ yellowish28
- 27. Mid femur with a series of posteroventral bristles; proboscis pollinose; first abdominal sternum bare*comata* n. sp.
- Mid femur with no posteroventral bristles; proboscis polished, shining; first abdominal sternum with a few setulæ*placida*, n. sp.
- 28. Hind femur with a complete series of strong anteroventral bristles; abdomen with conspicuous brownish patches on ventral aspect of terga*compuncta* Wiedemann
- Hind femur with a series of 4 or 5 bristles confined to distal half of anteroventral surface, with a series of bristly hairs on proximal half; abdomen with no brownish areas on ventral aspect of terga29
- 29. Proboscis pollinose; first abdominal sternum with a few setulæ; thorax with three heavy dark brown vittæ and a broad fuscous area immediately caudad of transverse suture between the dorsocentral bristles. *alliterata*, n. sp.
- Proboscis polished; first abdominal sternum bare; thorax with at most a well marked median vitta, the sublaterals obscure.....30

30. Tibiæ more or less yellowish; cheek higher than breadth of parafacial at base of antennæ, the parafacials markedly restricted ventrad; fore tibia with no median posterior bristle *rufitarsis* Stein
- Tibiæ entirely black; cheek not higher than breadth of parafacial at base of antennæ, parafacials at narrowest as broad as width of third antennal segment; fore tibia with one or more median posterior bristles *incauta*, n. sp.
31. Mesopleural series of bristles with a weaker intermediate predorsal bristle 32
- Mesopleural series of bristles with no predorsal bristle, the intermission bare 34
32. Thorax with three narrow distinctive brownish vittæ between the dorso-central bristles; calyptræ yellowish *trilineata*, n. sp.
- Thorax with a single vitta between the dorsocentral bristles, at most; calyptræ whitish 33
33. Scutellum with appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; ovipositor with fine spinules on subanal plate; blackish species *addicta*, n. sp.
- Scutellum with no appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; ovipositor with fine setulose hairs on subanal plate; grayish species *imitatrix* Malloch
34. Presutural acrosticals irregularly paired, bristlelike, stronger developed than the scutellar setulæ; frontal vitta almost obliterated by the pronounced ocellar triangle, the latter is densely pollinose, concolorous with parafrontals and reaches to base of antennæ; calyptræ white.
- *brevicornis* Malloch
- Presutural acrosticals setulose, not stronger developed than scutellar setulæ 35
35. Discal area of mesonotum with dense seal brown infuscation covering uniformly the postsutural and presutural regions; mesopleura pearlescent gray; parafrontals seal brown infuscated; frontal vitta rufous cephalad; mid femur with posteroventral bristles setulose; proboscis pollinose *torreyæ* Johannsen
- Discal area of mesonotum vittate, not entirely infuscated; proboscis polished, glossy 36
36. Scutellum with appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; hind tibia with one anterodorsal bristle; ovipositor with fine setulæ on anal plates.
- *denudata* Holmgren
- Scutellum with no appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; hind tibia with two or more anterodorsal bristles 37
37. Ovipositor with spinules on anal plates 38
- Ovipositor with fine setulæ only on anal plates 40
38. Mid tibia with 2 or more well developed anterodorsal bristles; wings

- infuscated, cross veins faintly clouded; costa with a short series of stoutly developed setulæ proximad of costal thorn, the setulæ fully as long as width of costa *sospita*, n. sp.
- Mid tibia with at most one anterodorsal bristle; wings clear, hyaline, cross veins clear; costal setulæ proximad of costal thorn weakly developed 39
39. Pale grayish species; lunule at base of antennæ silvery pruinose; first abdominal sternum with a few hairs or setulæ; parafrontals with brownish infuscation confined to a narrow border adjacent frontal vitta *placida*, n. sp.
- Dark grayish species; lunule at base of antennæ brownish black pruinose; first abdominal sternum bare; parafrontals broadly brownish infuscated to margin of eye *monacantha* Collin
40. Sternopleura with a noticeable tuft of bristles ventrad; parafacials broader and cheeks higher than length of third antennal segment. *pulvicrura*, n. sp.
- Sternopleura with bristles not tufted ventrad, arranged more or less in series; parafacials and cheeks at narrowest dimensions not more than length of third antennal segment 41
41. Parafacials at greatest breadth and cheeks at greatest height about equal to length of third antennal segment; calyptre intensively yellowish; buccæ with a single series of sparsely set bristles along ventral margin *incauta*, n. sp.
- Parafacials at greatest breadth and cheeks at greatest height not equal to length of third antennal segment; calyptre, at most, tinged; buccæ with a series of closely set setulæ and bristles along ventral margin 42
42. Mid tibia with one or more median anterodorsal bristles; *m-cu* cross vein clouded; abdomen subshining, highly pruinose, with large broad subtriangular marks on terga 3 and 4 that extend ventrad along the caudal margin of each segment; scutellum with blackish areas at basal angles *fuscomarginata*, n. sp.
- Mid tibia with no median anterodorsal bristle; *m-cu* cross vein clear; abdomen densely pollinose, opaque; with comparatively small brownish marks on terga 3 and 4, restricted to dorsum; scutellum entirely grayish pollinose *crassiventris*, n. sp.
43. Tibiæ yellowish 44
- Tibiæ blackish 45
44. Scutellum with appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; mid tibia with no anterodorsal bristle; fore tibia with no median posterior bristle *rufitibia* Stein
- Scutellum with no appressed setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; mid tibia with 1 or 2 anterodorsal bristles; fore tibia with one posterior bristle *suspecta* Malloch

45. Mesonotum, scutellum and frons largely covered with deep seal brown coloration; humeral callosity with one bristle (the inner bristle weakly developed, setulose); proboscis pollinose, not shining.
torreyæ Johannsen
- Mesonotum, scutellum, and frons largely grayish, at most the former vittate, and the scutellum with spots at basal angles; humeral callosity with two bristles46
46. Ovipositor with spinules on anal plate47
- Ovipositor with fine hairs or setulæ on anal plates; no spinules.....49
47. Scutellum with preapical bristles well developed, in size at least as robust as basal bristles; mid femur with one or two strong erect bristles on basal third of posteroventral surface.....*bisetosa*, n. sp.
- Scutellum with no noticeable preapical bristles, if present, they are weaker than the basal bristles; with setulose hairs on dorsal margin of lateral declivities adjacent the apical bristles.....48
48. Mid femur with a series of bristles on proximal half of posteroventral surface; fore tibia with a median posterior bristle; *m-cu* cross vein clear*surda* Zetterstedt
- Mid femur without, or with but one or two widely separated bristles on proximal half of posteroventral surface; fore tibia with no posterior bristle at middle; *m-cu* cross vein cloudy.
acuticornis Malloch
49. Costa with a series of strong erect setulæ between the junctures of auxilliary and humeral cross vein with costa, the setulæ longer than diameter of costa; scutellum with setulose hairs on dorsal margin adjacent apical bristles; vertical bristles of head separated by a distance about equal to that between first pair of dorsocentral bristles.
pluvialis, n. sp.
- Costa with no series of prominent setulæ between the junctures of auxilliary and humeral cross vein with costa; scutellum with no setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; vertical bristles of head separated by a distance less than that between first pair of dorsocentral bristles50
50. Mid tibia with no anterodorsal bristle; mid femur with 1 or 2 bristles on proximal third of posteroventral surface; proboscis pollinose; scutellum entirely pale grayish51
- Mid tibia with 1 or 2 anterodorsal bristles; mid femur with a series of at least 3 or 4 bristles on proximal half of posteroventral surface; proboscis shining; scutellum with trace of fuscous areas at basal angles52
51. Scutellum with setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; cheeks at narrowest height about one fourth that of eye; fore tibia with no median posterior bristle; fore coxæ with the inner series of bristles on anterior surface not robust.
reflecta, n. sp.

- Scutellum with no setulose hairs on dorsal margin of lateral declivities adjacent apical bristles; cheeks at narrowest height about one sixth that of eye; fore tibia with 1 or 2 median posterior bristles; fore coxæ with the inner series of bristles on anterior surface robustly developed*parvimaculata* Stein
- 52. Hind femur with a series of longish bristles restricted to median third of posteroventral surface, the proximal third devoid of bristles.
gibsoni Malloch
- Hind femur with, at most, a series of longish setulæ on proximal third of posteroventral surface, the median third with no longish bristles...53
- 53. Width of parafacials at base of antennæ, when viewed in profile, not less than one third the diameter of eye immediately caudad of this position; cheeks about as high as one third that of eye.
incauta, n. sp.
- Width of parafacials at base of antennæ not equal in breadth to one third the diameter of eye immediately caudad of this position; cheeks not as high as one third that of eye54
- 54. Parafrontals with seal brown infuscation along the border of frontal vitta; frontal vitta and frontal triangle with seal brown pruinescence55
- Parafrontals entirely slate gray pruinosecent, with no brownish infuscation along the margin of frontal vitta; frontal vitta and frontal triangle with grayish pruinescence.....56
- 55. Both upper and lower calyptra intensively yellowish; parafacials at narrowest breadth narrower than width of third antennal segment*anthrax* Bigot
- Calyptræ yellowish tinged; parafacials at narrowest breadth at least as wide as third antennal segment*magnipunctata* Malloch
- 56. Hind femur with anteroventral series of bristles continued to base; thorax with a median vitta.
contractifrons var. *fumipennis* Zetterstedt
- Hind femur with anteroventral series of bristles confined to distal two-thirds, not continued to base; thorax with no median vitta.
alticola Malloch

(To be Continued)